CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY
REGIONAL WATER QUALITY CONTROL BOARD
COLORADO RIVER BASIN REGION

PATHOGEN
TOTAL MAXIMUM DAILY LOAD
FOR THE NEW RIVER

AND

IMPLEMENTATION PLAN

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Watershed Protection Branch

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LIST OF ACRONYMS AND ABBREVIATIONS

AF	Acre-feet
Ag	Agricultural
AFY	Acre-feet per year
BECC	Border Environment Cooperation Commission
BEIF	Border Environment Infrastructure Fund
bgs	below grade surface
BMPs	Best Management Practices
BTAC	Binational Technical Advisory Committee for New River/Mexicali Sanitation Project
CAFO	Confined Animal Feeding Operation
CalEPA	California Environmental Protection Agency
CEQA	California Environmental Quality Act
CESPM	Comisión Estatal de Servicios Públicos del Estado
CDO	Cease and Desist Order
CFR	Code of Federal Regulations
cfs	cubic feet per second
CILA	Comisión Internacional de Limites y Aguas
Clean Water Act	Federal Water Pollution Control Act
CNA	Comision Nacional del Agua (Mexican National Water Commission)
CRBRWQCB	Colorado River Basin Regional Water Quality Control Board
CWA	Clean Water Act
CWC	California Water Code
DHS	Department of Health Services, State of California
DGMHP	Date Gardens Mobile Home Park
EAI	Enforcement Action Implementation
E. coli	Escherichia coli bacteria
EWMP	Engineered Waste Management Plan
FRSH	Freshwater Replenishment
gal/day	gallons per day
GeoM	Geometric Mean
IBC	International Boundary Commission
IBWC	International Boundary and Water Commission
IND	Industrial Service Supply
INEGI	Instituto Nacional de Estadística Geografía e Informática
IID	Imperial Irrigation District
kg	kilogram
LA	Load Allocation
MCUSD	McCabe Union School District
mg/L	milligram per liter

ACRONYMS (cont.)

mgd	million gallons per day
ml	milliliter
MOS	Margin of Safety
MPN	Most Probable Number
MSL	Mean Sea Level
NADBank	North America Development Bank
NAFTA	North American Free Trade Agreement
NPDES	National Pollutant Discharge Elimination System
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service
Porter-Cologne Act	California Porter-Cologne Water Quality Control Act
QAPP	Quality Assurance Project Plan
RARE	Preservation of Rare, Threatened, or Endangered Species
REC I	Water Contact Recreation
REC II	Water Non-contact Recreation
Regional Board	Regional Water Quality Control Board
RWQCB	Regional Water Quality Control Board
SAHOPE	Secretaría de Asentamientos Humanos y Obras Públicas del Estado
SCWD	Seeley County Water District
SEDESOL	Secretaría de Desarrollo Social
SEDUE	Secretaría de Desarrollo Urbano y Ecología
SSA	Salton Sea Authority
SWDS	Solid Waste Disposal Site
SWRCB	State Water Resources Control Board
TCO	Total Coliform Organisms
TMDL	Total Maximum Daily Load
TSO	Time Schedule Order
UCCE	University of California Cooperative Extension
USBR	United States Bureau of Reclamation
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WARM	Warm Freshwater Habitat
WDR	Waste Discharge Report
WDS	Workplan Development and Submittal
WILD	Wildlife Habitat
WLA	Waste Load Allocation
WQO	Water Quality Objective
WQS	Water Quality Standard(s)
WWTP	Waste Water Treatment Plant

EXECUTIVE SUMMARY

INTRODUCTION

The New River, a water of the United States, is located in the southeastern portion of the Salton Sea Transboundary Watershed. This Watershed consists almost entirely of highly productive farmland irrigated with water imported from the Colorado River. The New River is one of the main tributaries to the Salton Sea, which is California's largest inland surface water. The climate is arid, with an average precipitation of less than 3 inches per year.

The River carries partially treated and untreated wastes from the Mexicali Valley in Mexico across the International Boundary into the United States. The River also receives treated disinfected and undisinfected domestic wastewater from Imperial Valley wastewater treatment plants. The New River's flow consists mostly of agricultural return flows from the Imperial Valley.

The New River is severely polluted by pathogens as indicated by fecal coliforms and *Escherichia coli* (*E. coli*) bacteria. These bacteria are present in discharge waste from the Mexicali Valley in Mexico and in discharges of treated but undisinfected wastewater from some Imperial Valley wastewater treatment plants.

The California Regional Water Quality Control Board, Colorado River Basin Region (hereafter "Regional Board") is charged by the California Water Code (CWC) with protecting the Region's water quality. The Regional Board also is responsible for implementing pollution control measures required by the Federal Clean Water Act (CWA). In 1998, the Regional Board listed the New River on California's Clean Water Act Section 303(d) as water quality impaired, in part, because of the River's high bacteria concentration.

CWA Section 303(d) requires the State to establish Total Maximum Daily Loads (TMDLs) for those pollutants causing water quality impairments to ensure that impaired waters attain their beneficial uses. A TMDL is pollutant-specific and consists of the maximum amount of the pollutant that a waterbody can assimilate and still meet its beneficial uses.

PROPOSED TMDL

This proposed Pathogen TMDL report (hereafter "TMDL Report") identifies the total allowable concentrations of fecal coliforms and *E. coli* bacteria for sources discharging wastes into the New River. When the allowable concentrations are achieved, they are expected to eliminate bacteria-caused impairments.

The Regional Board's water quality objectives (WQOs) for bacteria are expressed in terms of general pathogenic microorganisms (e.g., bacteria, viruses and fungi). This TMDL is expressed in terms of specific indicator microorganisms (e.g., fecal coliforms, *E. coli* and enterococci bacteria). These microorganisms are in use as indicators by the Region until better tests for specific pathogens become more readily available. Like the WQOs, the proposed targets and allocations in this TMDL are expressed in terms of general pathogenic microorganisms (e.g., bacteria, viruses, and fungi).

Specifically, this TMDL:

- Identifies the bacteria loading problems that prompted TMDL development;
- Specifies an in-stream numeric target for pathogen concentrations (via indicator micro-organisms);
- Analyzes the sources of pathogens causing the impairment;
- Allocates allowable loads for pathogen sources;
- Links the water quality standards with the TMDL; and
- Describes the implementation plan for the TMDL.

Table E.1, below, summarizes the technical components of this TMDL.

Table E.1: New River Pathogen TMDL Summary

<table>
<tr><th>ELEMENT</th><th>DESCRIPTION</th></tr>
<tr><td>Problem Statement
(impaired water quality standard)</td><td>The New River headwaters start about 20 miles south of Calexico, in the Mexicali Valley of Mexico. Bacteria, which are pathogen-indicator organisms, impair the entire segment of the New River in the United States. Pollution is most severe at the International Boundary due to discharges of wastes from Mexico. Concentrations of fecal coliforms and E. coli bacteria exceed the water quality objectives established to protect mainly the water contact and non-water contact recreational beneficial uses of the New River.</td></tr>
<tr><td>Numeric Target</td><td>This TMDL's in-stream numeric water quality targets are:

<u>Indicator Parameters</u> | <u>30-day Geometric Mean[a]</u> | <u>Maximum</u>
Fecal Coliforms | 200 MPN[b]/100 ml | c
E. Coli | 126 MPN/100 ml | 400 MPN/100 ml
Enterococci | 33 MPN/100 ml | 100 MPN/100 ml

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most Probable Number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.</td></tr>
<tr><td>Source Analysis</td><td>The New River's main sources of pathogens (indicated by fecal coliforms and E. coli bacteria) are discharges of municipal wastes from the Mexicali Valley in Mexico and undisinfected but treated wastewater from five domestic Imperial Valley wastewater treatment plants. Natural sources of pathogens play a relatively insignificant role, but their actual contribution needs to be properly characterized, along with the contribution from confined animal feeding operations and other nonpoint sources of pollution.</td></tr>
</table>

ELEMENT	DESCRIPTION
Allocations and Margin of Safety	Discharges from point sources and nonpoint sources of pollution shall not exceed the following waste load allocations (WLAs) and load allocations (LAs), respectively: **WLAs and LAs** **Indicator Parameters** / **30-Day Geometric Mean**[a] / **Maximum** Fecal Coliforms / 200 MPN[b]/100 ml / c *E. coli* / 126 MPN/100 ml / 400 MPN/100 ml Enterococci / 33 MPN/100 ml / 100 MPN/100 ml a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period. b. Most Probable Number. c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml. Allocations are applicable throughout the entire stretch of the American portion of the New River. Numeric targets are based on extensive epidemiological studies conducted by USEPA and others. The studies are based on risk analyses, which implicitly contain a margin of safety. This TMDL includes an additional implicit margin of safety, as dilution from agricultural return flows and industrial discharges was not factored into the selection of the target. Therefore, the concentrations contain an adequate margin of safety.
Linkage and Loading Capacity	Most of the pathogenic pollution comes from Mexico and domestic Imperial Valley WWTPs. Therefore, direct and indirect controls on these sources should: (a) result in attainment of bacteria WQOs and, (b) address bacteria-caused impairments. The temporal variability of the River's bacteria concentrations is currently unknown and needs to be determined pursuant to this TMDL. As the New River travels downstream, fecal coliforms and *E. coli* concentrations decrease significantly from the millions at the International Boundary to the low one thousands at its terminus with the Salton Sea.

ELEMENT	DESCRIPTION
Implementation Plan	CWC Section 13242 requires the Regional Board to adopt an implementation plan for achieving WQOs. The Implementation Plan, contained in Section 7 of this TMDL, describes implementation actions, including recommendations by appropriate agencies/organizations, time schedules, and monitoring activities to determine progress toward attaining deadlines and milestones. In summary, staff recommends that: • All NPDES permits for WWTPs discharging into the New River and/or its tributaries require compliance with bacteria effluent limitations that reflect WLAs. This should resolve the impairment caused by Imperial Valley WWTPs. • Surveillance and enforcement of existing general NPDES permits should continue for Confined Animal Feeding Operations (CAFOs), to prevent chronic water quality impairments and address potential acute water quality impairments; • The Regional Board request the U.S. government to develop and submit a proposed plan to address the pollution from Mexico and ensure compliance with the WLA and LA at the International Boundary; and • A monitoring program be adopted to assess TMDL implementation and effectiveness and adjust the TMDL as appropriate.

The California Secretary for Resources has certified the Basin Plan amendment process as exempt from the requirements of the California Environmental Quality Act (Title 14, Section 15251(g) of the California Code of Regulations) to prepare an Environmental Impact Report or Negative Declaration. Attached to or included in this TMDL report are:

- The proposed Basin Plan amendment to establish the TMDL (Attachment 1);
- The proposed Regional Board Resolution to adopt the proposed Basin Plan amendment (Attachment 2);
- An analysis of potential environmental impacts (i.e., environmental check list and discussion) resulting from the adoption of the Basis Plan Amendment, as required by the California Environmental Quality Act (Attachment 3); and
- An analysis of potential economic costs for disinfection (Attachment 4); and
- A discussion of potential economic costs to WWTPs, and potential sources of funding and technical assistance for TMDL implementation (Section 7.8 of this TMDL);

The amended Basin Plan, Environmental Checklist, TMDL Report, and supporting documentation are functionally equivalent to an Environmental Impact Report or Negative Declaration pursuant to the California Environmental Quality Act (CEQA).

PHASED TMDL

There are limited data available to calculate and/or estimate the actual pathogenic contributions from nonpoint sources of pollution in the Imperial Valley (e.g., agricultural return flows) and establish appropriate controls if necessary. Preliminary data suggest their contribution is relatively insignificant. This warrants the use of a phased approach as recommended by USEPA Guidance (USEPA 1991).

The numeric target, load allocations, waste load allocations, and margin of safety must be established for point and nonpoint sources of pollution when implementing a phased approach. This TMDL consists of two phases. Phase I (2001-2004) focuses on: (1) controlling the pathogenic contribution from Imperial Valley wastewater treatment plants and the International Boundary, which are the most significant sources of bacterial impairments to the New River; and (2) collecting data for source analysis and for establishing overall water quality trends. Phase II (2004-2007) focuses on: (1) further characterization of actual pathogenic contributions from nonpoint sources of pollution, and (2) development of appropriate controls for these sources.

Successful implementation of Phase I is critical to reduce pollution to a level that allows for further identification and characterization of the contribution from more diffuse sources. The phased approach reduces pollution by major polluters without the delay of new data collection and analysis. Monitoring results for both Phases also may provide an analytical basis for TMDL modification.

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1. INTRODUCTION

The New River, located in the Salton Sea Transboundary Watershed, has a long history of pollution problems. The development of irrigated agriculture in the Imperial Valley and the population explosion in the City of Mexicali, Mexico (located just south of the Mexican border) have resulted in widespread surface water pollution from human sources in the watershed. The New River is listed on the State's 303(d) list as impaired by bacteria, pesticides, VOCs, silt, and nutrients.

The Salton Sea Transboundary Watershed encompasses over one third of the Region and is the priority watershed for cleanup. In particular and on a priority basis, the New River has been targeted for development and implementation of a TMDL that addresses pathogens. As indicated in the Source Analysis of this report, approximately one-third of the New River flow consists of untreated/improperly treated wastes (raw sewage being the most detrimental) from point and nonpoint sources of pollution discharging in the Mexicali Valley, Mexico. Bacterial concentrations indicated by fecal coliforms and *Escherichia coli* (*E. coli*), violate water quality standards promulgated in the Regional Board's Basin Plan, and Minute No. 264 of the Mexican-American Water Treaty. The magnitude of the violation is indicative of a serious public health threat that has resulted in the impairment of the New River's designated beneficial uses. In order to regulate this problem, the Regional Board proposes to set waste load and load allocations, in terms of concentration, at 200 MPN/100 ml for fecal coliforms, 126 MPN/100 ml for *E. coli*, and 33 MPN/100 ml for enterococci. These water quality objectives represent acceptable bacteria concentration levels with respect to the protection of designated beneficial uses and human health. In accordance with the California Water Code, the Regional Board has developed an implementation plan with an accompanying Basin Plan amendment to ensure attainment of the WQOs. Because part of the watershed is located in Mexico, it is important to note that this TMDL only applies to portions of the New River over which the State has jurisdiction. The U.S. federal government is expected to cooperatively address pathogen control with Mexico to ensure TMDL compliance where the New River enters California.

1.1.1 CLEAN WATER ACT SECTION 303(D) LIST AND TMDL PROCESS

Section 303(d)(1)(A) of the Clean Water Act (CWA) requires the California Regional Water Quality Control Board, Colorado River Basin Region (hereafter Regional Board), to:

- Identify the Region's waters that do not comply with water quality standards (WQS);
- Rank the impaired waterbodies, taking into account the severity of pollution and the uses made of such waters; and
- Establish TMDLs for those pollutants causing the impairments to ensure that impaired waters attain their beneficial uses.

Title 40, Code of Federal Regulations (40 CFR), Section 130.3, defines a water quality standard as the water quality goals of a water body, or portion thereof, by designating the use or uses to be made of the water and by setting criteria necessary to protect those uses, including antidegradation criteria. A TMDL is defined as the sum of the individual waste load allocations (WLAs) for point sources of pollution, plus the load allocations (LAs) for nonpoint sources of pollution and natural background pollution, plus a margin of safety such that the capacity of the waterbody to assimilate pollutant loadings without violating water quality standards is not exceeded. A TMDL can be expressed in terms of either mass per time, toxicity, concentration, a specific chemical, or other appropriate measure. In the case of this TMDL, the most appropriate measure currently available is a density-based measure (concentration) as indicated by fecal coliforms and *E. coli* results.

The Section 303(d) List identifies the New River as water quality limited, in part, because the concentrations of pathogen-indicator bacteria violate the water quality standards (WQS) established by the Regional Board to protect the beneficial uses of the river.

This pathogen TMDL addresses the bacterial impairments of the New River. CWA Section 303(d) and 40CFR Section 130.0 et seq., specify the components and requirements of a TMDL. Essentially, the TMDL is a numeric target developed to achieve water quality standards and must:

- Show how the TMDL will result in attainment of standards of concern in the specific waterbody;
- Identify and explain the basis for the total allowable load(s) such that the water body loading capacity is not exceeded;
- Identify and explain the basis for individual waste load allocations for point sources and load allocations for nonpoint sources of pollution;
- Explain how an adequate margin of safety is provided to account for uncertainty in the analysis; and
- Account for seasonal variations and critical conditions concerning the flow, loading, and other water quality parameters.

If the State fails to develop a TMDL, or if USEPA rejects the State's TMDL, USEPA must develop one (CWA 303(d) (2), 40 CFR 130.6(c)). Upon approval of the TMDL by USEPA, the State is required to incorporate the TMDL, along with appropriate implementation measures, into the State Water Quality Management Plan (40 CFR 130.6(c)(1), 130.7). The Water Quality Control Plan for the Colorado River Basin (Basin Plan) and applicable statewide plans serve as California's Water Quality Management Plan governing the New and Alamo Rivers and Agricultural Drains. At a minimum, a TMDL should have the components shown in Table No. 1.1. below:

Table 1.1 Basic Technical TMDL Components

Component	Purpose
Problem Statement	Identifies the context for TMDL development and WQS issues that prompted TMDL development.
Numeric Target	Identifies specific instream goals and endpoints for the TMDL, which ensure attainment of applicable WQS.
Source Analysis	Characterizes the amount of pollutants entering the receiving water from various sources (e.g., point, nonpoint, and natural sources of pollution).
Loading Capacity Linkage Analysis	Specifies the critical quantitative link between applicable WQS and the TMDL. Loading capacity reflects the amount of a pollutant that may be delivered to the waterbody and still achieve WQS.

Component	Purpose
Load Allocations, Waste Load Allocations, Margin of Safety	Provides the calculations for total allowable loads and allocation of these loads among different sources such that applicable WQS are attained, while accounting for seasonal variation and uncertainty in the analysis of the data.
Monitoring Plan	Assesses TMDL implementation and effectiveness, and provides for TMDL adjustment as needed.
Implementation Plan	Specifies nonpoint source Best Management Practices, point source controls, and other actions necessary to implement the TMDL.

Public participation is a cornerstone of the TMDL process. This TMDL is being developed with significant public input from the Salton Sea Authority, Citizens Congressional Task Force for the New River (hereafter "Task Force"), and others. The Task Force's goal is to address overall pollution in the New River. The Task Force includes: private citizens; representatives from federal, state, and local governments; educational institutions (e.g., University of California Cooperative Extension at Holtville and Imperial Valley College); and other non-profit organizations.

The TMDL also is being developed in consultation with United States representatives of the New River/Mexicali Sanitation Project Binational Technical Advisory Committee (BTAC) and the City of Calexico. The U.S. BTAC members include:

- Imperial County,
- Imperial Irrigation District,
- International Boundary and Water Commission (IBWC),
- Regional Water Quality Control Board – Colorado River Basin,
- United States Environmental Protection Agency, and
- State Water Resources Control Board.

Regional Board staff also conducted comprehensive public outreach regarding the development and implementation of this TMDL through multiple public presentations and meetings with stakeholders.

2. PROBLEM STATEMENT

The New River was recognized as a significantly polluted surface waterbody as early as the late 1940s, due to extremely high concentrations of fecal coliform bacteria and stench at the International Boundary. This problem statement describes the violated water quality standards that prompted TMDL development, as well as background information (hydrogeological and biological setting, weather, and Imperial County land uses).

Recent water quality sampling results from the watershed indicate extremely elevated concentrations of *E. coli* bacteria, an established water quality indicator of pathogens. These concentrations violate: (1) narrative and numeric standards in the *Water Quality Control Plan for the Colorado River Basin Region* (Basin Plan) (Colorado River Basin Regional Water Quality Control Board 1994), and (2) narrative standards in Minute No. 264 of the Mexican-American Water Treaty. The violation of these standards indicates the impairment of the New River's designated beneficial uses due to bacteria concentrations that create a serious public health hazard. People who fish and recreate at the New River are at risk of exposure to infectious, disease-causing agents. Wildlife are likewise in danger.

The New River's two major bacteria sources are: (1) NPDES facilities that discharge undisinfected or improperly disinfected wastes in violation of permits, and (2) the municipality of Mexicali, Mexico, which has an inadequate sewage infrastructure that discharges raw and partially treated sewage.

2.1 WATER QUALITY STANDARDS

Regional water quality standards (WQS) are contained in the Water Quality Control Plan for the Colorado River Basin Region. The WQS for the New River are comprised of the beneficial uses of water and the water quality objectives (numerical or narrative) designed to protect the most sensitive beneficial uses. For the New River, the most sensitive designated beneficial uses are water contact recreation (REC I) and water non-contact recreation (REC II). Pathogens may adversely affect beneficial uses that support wildlife and aquatic habitats. This TMDL's purpose is to eliminate the impairments that pathogens are causing on the beneficial uses summarized in Table 2.1, below.

Table 2.1 New River Beneficial Uses

Designated Beneficial Uses of Water	Description
Water Contact Recreation (REC I)	Uses of water for recreational activities involving body contact with water, where ingestion of water is reasonably possible. These uses include, but are not limited to, swimming, wading, water skiing, skin and scuba diving, surfing, whitewater activities, fishing, and use of natural hot springs.

Designated Beneficial Uses of Water	Description
Water Non-Contact Recreation (REC II)	Uses of water for recreational activities involving proximity to water, but not normally involving contact with water where ingestion of water is reasonably possible. These uses include, but are not limited to, picnicking, sunbathing, hiking, beachcombing, camping, boating, tidepool and marine life study, hunting, sightseeing, or aesthetic enjoyment in conjunction with the above activities.
Freshwater Replenishment (FRSH)	Uses of water for natural or artificial maintenance of surface water quantity or quality.
Industrial Service Supply (IND)	Uses of water for industrial activities that do not depend primarily on water quality including, but not limited to, mining, cooling water supply, hydraulic conveyance, gravel washing, fire protection, and oil well re-pressurization.
Warm Freshwater Habitat (WARM)	Uses of water that support warm water ecosystems including, but not limited to, preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates.
Wildlife Habitat (WILD)	Uses of water that support terrestrial ecosystems including but not limited to, the preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources.
Preservation of Rare, Threatened, or Endangered Species (RARE)	Uses of water that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened, or endangered.

Source: California Regional Water Quality Control Plan for the Colorado River Basin Region (Colorado River Basin Regional Water Quality Control Board 1994)

The Basin Plan prescribes quantitative pathogen water quality objectives (WQOs) for public health protection that are applicable to the New River downstream of the International Boundary. The standards are specified in terms of *E. coli*, enterococci, and fecal coliform bacteria. The *E. coli* and enterococci criteria are based on bacterial criteria adopted in 1986 by USEPA for fresh waters. Enterococci testing is not commercially available in the Region. Therefore, the Regional Board uses fecal coliform criteria recommended by USEPA in 1986. *E. coli* is a particular type of fecal coliform bacteria, which are a subgroup of total coliform bacteria. Enterococci are a subgroup of the fecal streptococci. High concentrations of fecal coliform and *E. coli* indicate a high likelihood that human infectious pathogens are present. Table 2.2, below, summarizes the Basin Plan quantitative pathogen WQOs for the New River downstream of the International Boundary.

Table 2.2 REC1 Water Quality Objectives for New River

Indicator Parameter	30-Day Geometric Mean	30-Day Log Mean[a]	Maximum	Other
E. coli	126 MPN[b]/100 ml	--	400 MPN/100 ml	
Enterococci	33 MPN/100 ml	--	100 MPN/100 ml	
Fecal Coliform	--	200 MPN/100ml	--	c

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

Minute No. 264 of the Mexican-American Water Treaty titled "*Recommendations for Solution of the New River Border Sanitation Problem at Calexico, California - Mexicali, Baja California Norte*" was approved by the Governments of the United States and Mexico effective on December 4, 1980. Minute No. 264 specifies qualitative and quantitative standards for the New River at the International Boundary, but does not specify a quantitative standard for bacteria[1]. Therefore, as indicated by the Basin Plan, the Regional Board views the Minute No. 264 standards as interim standards and intends to pursue long-range quantitative standards for the New River at the International Boundary beyond those contained in Minute No. 264. These long-range standards include bacterial WQOs, which are the same as the WQOs applicable to the New River downstream of the International Boundary. They may also include more stringent standards as dictated by the TMDL. Table 2.3, below, shows the narrative water quality objectives of Minute No. 264, which also are being addressed by this TMDL.

Table 2.3 Summary of Minute No. 264 WQOs Addressed by TMDL

Untreated Domestic and Industrial Wastes: The waters of the River shall be free of untreated domestic and industrial waste waters.
Toxic Substances: The waters of the River shall be free from substances that may be discharged into the River as a result of human activities in concentrations which are toxic or harmful to human, animal or aquatic life or which may significantly impair the beneficial uses of such waters.

[1]Minute No. 264 does contain bacteria objectives of "30,000 colonies per 100 ml, with no single sample exceeding 60,000 colonies per 100 ml". However, these objectives apply to the "New River Upstream of Discharge Canal", which is upstream of the International Boundary (i.e., in Mexico) and outside the jurisdiction of the Regional Board.

2.2 HYDROGEOLOGICAL SETTING

2.2.1 NEW RIVER WATERSHED

The New River watershed drains approximately 200,000 acres from the Imperial Valley, the Mexicali Metropolitan area, and approximately 300,000 acres in the Mexicali Valley, Mexico. The River carries agricultural runoff, partially treated and untreated Municipal and Industrial wastewater, stormwater, and urban runoff from the Mexicali Valley northward across the International Boundary into the United States (Table 2.4, below).

Within the United States, the New River channel is approximately 60 miles long and up to 2/3 mile wide. Within Mexicali, Mexico, this natural channel way extends about 12-16 miles.

The New River's flow at the International Boundary averaged 182,000 acre-feet/year (AFY) from 1980 to 1997 (Tetra Tech 1999). Once it crosses the International Boundary, the River travels approximately 60 miles through the Imperial Valley where it is fed by: (a) agricultural return water discharged to agricultural drains owned and operated by the Imperial Irrigation District (accounting for about 2/3 of the River's flow), (b) treated Municipal and Industrial wastewater, and (c) stormwater and urban runoff (Table 2.4). The flow of the New River is about 600 cfs (or roughly 434,400 AFY) at its outlet with the Salton Sea. Table 2.4, below, shows the estimated flow composition of the New River.

Table 2.4 New River Flow Sources

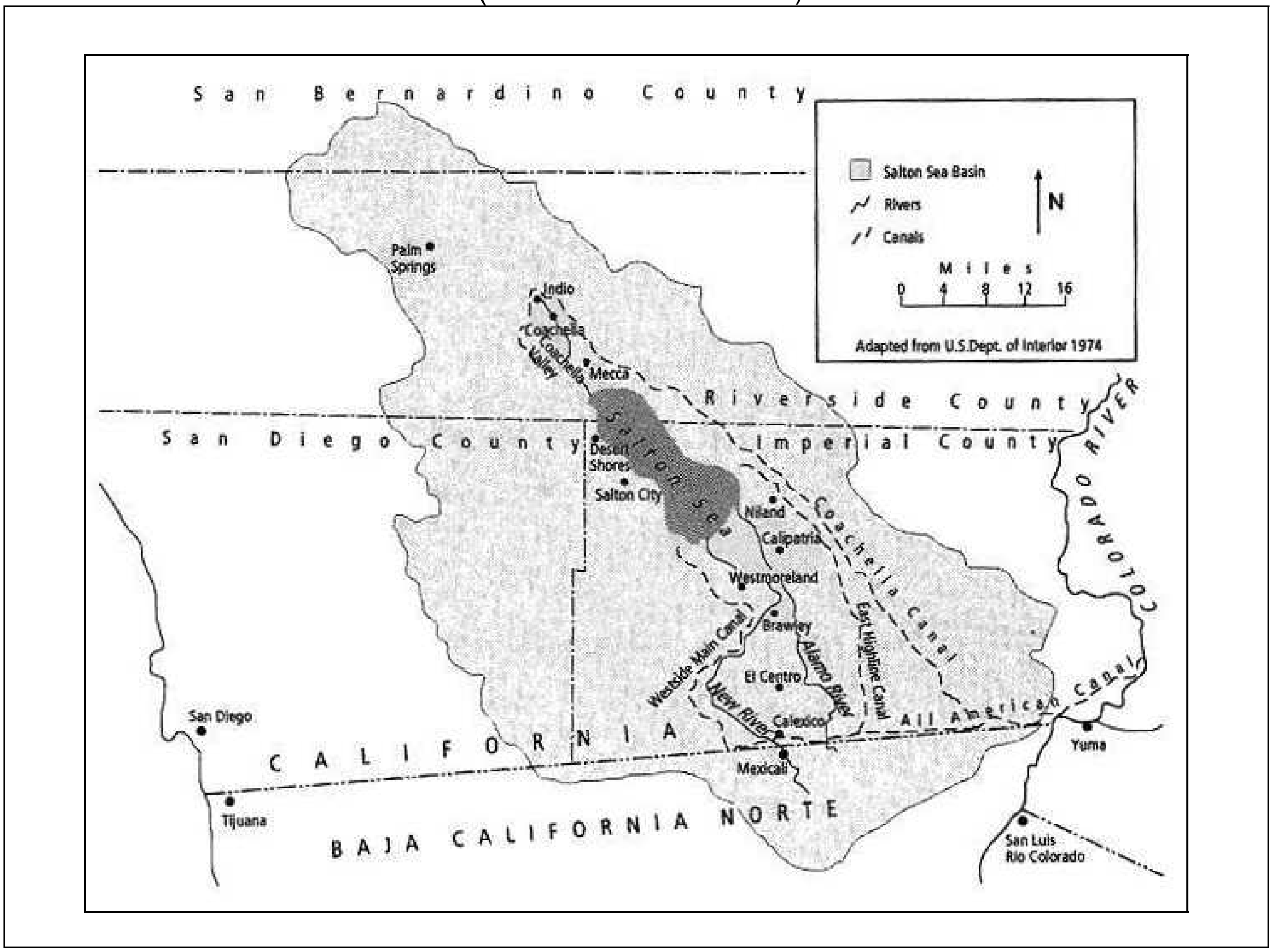
Source	Flow Contribution (% of 438,400 AFY)
American Sources	
Agricultural runoff	62%
Treated Municipal and Industrial wastewater	2%
Stormwater and urban runoff	<0.5%
Mexican Sources	
Agricultural runoff	25%
Partially treated and untreated Municipal and Industrial wastewater	8%
Stormwater, urban runoff, other	2.5%

2.2.2 SALTON SEA TRANSBOUNDARY WATERSHED

The Salton Sea Transboundary Watershed encompasses about 8,360 square miles and contains five of six of the Region's impaired surface waterbodies, as well as the New River watershed (a sub-watershed). The Salton Sea Transboundary Watershed receives most of its drainage from Imperial County, but also receives drainage from Coachella Valley in Riverside County and Mexicali Valley in Mexico. Most of the Watershed's drainage arrives via the New River and, to a lesser extent, the Alamo River. The Watershed's most striking feature is the Salton trough, which contains the Salton Sea. Figure 2.1, below, shows the Watershed's characteristics and boundaries.

Figure 2.1 Salton Sea Transboundary Watershed

(Source: Cohen et al. 1999)



Water quality issues in the Salton Sea Transboundary Watershed are divided into four geographical areas: Salton Sea, Imperial Valley, Mexicali Valley, and Coachella Valley. The Watershed's most significant water quality problems in the U.S. portion involve the Salton Sea and its major tributaries (the New and Alamo Rivers and Ag Drains). Table 2.5, below, shows the current Section 303(d) pollutants for the aforementioned surface waters.

Table 2.5 Imperial Valley Surface Waters 303(d) List

Waterbody	Pollutants of Concern
Imperial Valley Agricultural Drains	Sediment, Pesticides, Selenium
Alamo River	Sediment, Pesticides, Selenium
Salton Sea	Selenium, Salt, Nutrients
New River	Sediment, Pesticides, Bacteria, Nutrients, Volatile Organic Compounds (VOCs)

The Salton Sea is California's largest lake and is known for its sport fishery and recreational uses. The Sea is about 35 miles long and 9 to 15 miles wide, comprising approximately 380 square miles of water surface and 105 miles of shoreline. The surface of the Sea lies approximately 227 feet below mean sea level (MSL). The Sea is approximately 25% saltier than the ocean, with salinity increasing at approximately 1% per year. The Salton Sea is also a eutrophic lake.

The Salton Sea is a designated sump for agricultural wastewater from the Imperial and Coachella Valleys. In 1924 and 1928, then President Calvin Coolidge executed Public Water Reserve Order Numbers 90 and 114, respectively, for withdrawal of 123,360 acres of public land lying at an elevation of 220 feet below MSL, in and surrounding the Salton Sea. These lands were designated as a repository to receive and store agricultural, surface, and subsurface drainage waters. The State of California designated the Sea for this same purpose in 1968.

The Sea supports a National Wildlife Refuge and is a critical stop on the Pacific Flyway for migrating birds, including several state- and federally-listed endangered and threatened species. The Salton Sea National Wildlife Refuge was established in 1930 to preserve wintering habitat for waterfowl and other migratory birds. However, catastrophic die-offs of birds and fish since 1992 indicate the Sea is seriously impaired by a number of pollutants.

The New River is a transportation medium for pollution en route to the Salton Sea and discharges about 434,400 AFY (33% of the Sea's inflows) at the delta. The Alamo River is the Sea's largest tributary, contributing about 650,000 AFY (50% of the Sea's inflows). The Sea's current total inflow is about 1.3-million AFY.

2.2.3 FORMATION OF THE PRESENT SALTON SEA AND NEW RIVER CHANNEL

The Salton Sea, New River, and Alamo River formed due to a catastrophic flood event on October 11, 1905, when a temporary diversion for irrigation water from the Colorado River to the Imperial Valley failed during flood conditions (Gruenberg 1998). The entire flow of the Colorado River diverted to the Salton Basin. The breach in the dike was not repaired for another 16 months, in February 1907. The Colorado River then resumed its former course across the International Boundary into the Gulf of California.

Under normal circumstances, the Salton Sea would have dried up like its predecessor, Lake Cahuilla. However, the Sea's accidental creation coincided with agricultural development in the Coachella, Imperial, and Mexicali Valleys. Since then, agricultural return flows and domestic/municipal wastes have sustained the Salton Sea, New River, and Alamo River.

Figures 2.2 and 2.3, below, show the New River at the International Boundary and the New River channel and floodplain west of El Centro, California.

Figure 2.2 New River at the International Boundary

Figure 2.3 New River Channel and Floodplain West of El Centro, California

2.2.4 HISTORY OF NEW RIVER POLLUTION

The history of New River pollution is associated with Mexicali population growth and the inception of irrigated agriculture in the Imperial and Mexicali Valleys (Gruenberg 1998). In 1920, the total population of Mexicali was only 6,200. By 1955, about 25,000 people lived in Mexicali, and their raw sewage was being discharged into the New River.

Early complaints regarding New River pollution centered on odor. In the early 1950s, the River stench near the boundary was often overpowering, particularly at night. In 1956, the New River's flow at the boundary increased considerably due to development of agricultural drainage return flows from Mexicali Valley. This diluted the water, and temporarily alleviated the odor. However, the problem became increasingly noticeable in the 1960s as sewage loading increased as the population of Mexicali increased. In 1975, the population jumped to over 100,000 people[2]. The present population of the Mexicali municipality is reportedly 764,902 (INEGI 2001), but some believe it is close to 1 million.

In 1978, the California State Department of Health Services (DHS) recommended that the New River be posted as a public health hazard, due to the presence of raw sewage. The first of 50 signs along the River was posted.

Downstream of the International Boundary, the New River is dominated by agricultural return flows from Imperial Valley. Up until the late 1960s, the New River also conveyed raw sewage from nearby Imperial County cities and communities (e.g., Calexico, Brawley, and Westmorland). Three Imperial County landfills are adjacent to the River and are as problematic as similar dumps in Mexicali.

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[2]Due to the recent industrial growth in Mexicali, industry is now believed also to be an increasingly significant source of New River pollution.

2.2.5 LAND USES IN IMPERIAL COUNTY

The Imperial County covers approximately 4,597 square miles (2,942,080 acres) (Imperial County 1998). About 50% of County lands are undeveloped and under the jurisdiction and ownership of the federal government. Of the developed acreage, approximately 501,500 acres are zoned for agricultural purposes, most of which are in Imperial Valley. The developed areas (e.g., cities, communities, and support facilities) occupy less than 1% of the land within the county. The Salton Sea covers about 7% of the County's area. Table 2.6, below, shows the general land uses in Imperial County.

Table 2.6 Imperial County Land Use Distribution

Irrigated (Agriculture)	Acres	Data Source
Imperial Valley	479,327	IID 1999a
Bard Valley	14,737	Imperial County 1998
Palo Verde	7,428	Imperial County 1998
Developed		
Incorporated	9,274	Imperial County 1998
Unincorporated	8,754	Imperial County 1998
Desert/Mountains		
Federal	1,459,926	Imperial County 1998
State	37,760	Imperial County 1998
Indian	10,910	Imperial County 1998
Private	669,288	Imperial County 1998
Other		
Salton Sea	242,049	Tetra Tech Inc. 2000

The Imperial Valley contains over 480,000 acres of irrigated land in production. Major Valley crops, based on amount of land in production, are alfalfa, wheat, sudan grass, and sugar beets. According to IID data, about 448,238 acres were used for field crops, 95,030 for vegetables, and 21,605 for permanent crops in 1997. IID distributed between 2.6 and 3.2 million acre-feet of Colorado River water per year for irrigation from 1964 through 1998.

Imperial County has an agricultural-based economy, and is California's tenth-ranked agricultural county, producing over $1 billion dollars annually. One in three Imperial Valley jobs is agriculture-related (IID 1998b). For every $1,000 of total gross value produced in the agriculture sector, $209 of personal income is generated from agriculturally-related jobs (Imperial County Agricultural Commissioner 1997).

2.2.6 WEATHER

The climate of the Imperial Valley is hot, with dry summers, occasional thunderstorms, and gusty high winds with sandstorms. The area is one of the most arid in the United States, with an average annual rainfall of less than 3 inches, and temperatures in excess of 100ºF for more than 100 days per year. The average January temperature is 54ºF, and the average July temperature is 92ºF. Evapotranspiration rates for the Imperial Valley can exceed 7 feet per year, and in hot summer months, can be one-third inch per day. The frost-free period was greater than 300 days per year for 9 of 10 years, and greater than 350 days per year for 3 of 10 years (Setmire et al. 1990).

2.3 BIOLOGICAL SETTING

The New River is a part of the Salton Sea Transboundary Watershed and is therefore an important component of the Pacific Flyway, a major migratory route connecting Canada and the U.S. to Mexico and Central America. The degradation of wetland habitat elsewhere along the Pacific Flyway has rendered the area vital habitat for migratory avian species (USFWS 1997). Millions of birds representing hundreds of species, including several endangered species, use the watershed as year-round habitat.

However, the severe pollution of the New River significantly has prevented the establishment of a healthy ecosystem, especially within the first 10 to 20 river miles in the U.S. Pesticides, excessive nutrients, harmful pathogens, and lethal dissolved oxygen concentrations all combine to form an extremely hazardous environment for wildlife. However, unhealthy dissolved oxygen concentrations that are the most harmful. The diversity and abundance of life in the New River ecosystem is directly related to the River's dissolved oxygen trends (Setmire 1985).

By the time the river reaches the United States, the New River often is dominated by raw sewage and untreated industrial wastes from Mexicali. This causes the River's dissolved oxygen to become depleted (i.e., to be typically less than 1 mg/L) for up to 20 river miles downstream of the border. In the first 20 miles north of the border, dissolved oxygen concentrations are worse, often less than 0.5 mg/L. Fish diversity and populations are generally low here, with no more than 3 species collected and sometimes only a single individual collected (Setmire 1985).

As the New River courses through the Imperial Valley, a number of processes work to replenish the River with oxygen and thus greatly improve the opportunity for life: (1) bacteria breaks down organic waste by decreasing the organic load; (2) the River flows over drop structures which re-aerate the water through agitation; and (3) agricultural return flows input water that has a relatively high dissolved oxygen content. Dissolved oxygen levels return to around 4 mg/L, about 10 miles from the River's outlet to the Salton Sea.

The New River's riparian corridors and deltas are potential major wildlife movement corridors and constitute sensitive habitat. The dominant plant species in these corridors is salt cedar, an introduced species that has suffocates native vegetation. Other plant species include reeds, cattails, and arrowheads (Montgomery 1987).

Stream biota must withstand extremes in water quality arising from wild fluctuations in dissolved oxygen, as well as variation in temperature. These stresses result in severely decreased biological diversity in the New River. However, large numbers of birds flock to the area because of the water abundance in the middle of a desert. The diversity and abundance of bird species increases as dissolved oxygen increases, as the New River flows closer to the Salton Sea.

Birds are the most diverse wildlife group using the New River watershed. Over 50 bird species are represented. The most common birds are the burrowing owl (state and federal species of concern), savannah sparrow, yellow-rumped warbler, and red-winged blackbird. The New River watershed is also potential habitat for the Yuma clapper rail (state-fully-protected-threatened and federally endangered) (USFWS 1997) and California Black rail (state-fully-protected-threatened). Other songbirds and shorebirds that inhabit the area include the western yellow-billed cuckoo, great blue heron, black-necked stilt, American avocet, cattle egret, white-faced ibis, and double-crested cormorant.

Fish in the New River watershed include mosquitofish, carp, yellow bullhead channel and flathead catfish, tilapia, longjaw mudsucker, largemouth bass, red shiner, and sailfin mollie. The desert pupfish (state and federally endangered) is found in IID Ag Drains and the New River near the outlet to the Salton Sea (USFWS 1997). Fish species inhabiting the New River are relatively well-adapted to extreme conditions in water quality, but are still vulnerable to lethal dissolved oxygen concentrations in the upper reaches.

Predator/prey relationships in the New River resemble those of the Ag Drains, and can be divided into overlapping terrestrial and aquatic food chains. Aquatic invertebrates such as snails, waterboatmen, and insect larvae feed on plankton, detritus, and aquatic vegetation at the base of the aquatic food chain. Fish, such as the desert pupfish, tilapia, and mosquitofish represent the next level of the food chain, and feed on aquatic invertebrates and plankton. Crayfish and the Asiatic river clam feed on aquatic invertebrates but not on plankton. Rails, coots, and ducks—such as the ruddy duck, American coot, and northern shoveler—are the most versatile predators, feeding on an array of organisms including crayfish, clams, aquatic invertebrates, fish, and aquatic vegetation.

Larger birds such as the great blue heron and great egret represent the top of the food chain. These birds feed on organisms higher in the food chain while smaller birds, such as the American avocet and cattle egret, feed on organisms lower in the food chain. Turtles, such as the spiny softshell turtle, are also at the top of the food chain, and prey on fish as well as aquatic invertebrates and Asiatic river clams. The terrestrial food chain involves songbirds, flying and terrestrial invertebrates, rodents, and plant materials (USFWS 1997 and IID 1994).

2.4 SUMMARY OF EXISTING CONDITIONS

Fecal coliform and *E. coli* concentrations in the New River indicate polluted conditions that threaten public health, particularly near the International Boundary. The main sources of these pollutants are discharges of undisinfected wastes from wastewater treatment plants in the Imperial Valley and wastes from the Mexicali area. The presence of harmful and infectious pathogens is highly likely in the New River because of the presence of extremely high concentrations of fecal coliforms and *E. coli* bacteria.

2.4.1 BACTERIA IN THE NEW RIVER, AT THE INTERNATIONAL BOUNDARY, IN VIOLATION OF MINUTE NO. 264 STANDARDS

The Mexicali metropolitan area is serviced by two wastewater treatment lagoon systems that have a total combined rated design capacity of about 20 to 25 million gallons per day (mgd). The systems are organically and hydraulically overloaded because local municipal sewage flows at 35 to 40 mgd. Because of the lack of treatment capacity and an inadequate, dilapidated collection system, Mexicali discharges 5 to 20 mgd of untreated municipal wastewater into the New River or its tributaries. This constitutes a violation of the narrative standards of Minute No. 264.

Additionally, numerous point and nonpoint sources of pollution discharge untreated wastes into the River and its tributaries[3]. These untreated wastes and raw sewage bypasses have been

[3] A more detailed analysis of point and nonpoint sources of pollution within the Mexicali metropolitan area is presented in the Source Analysis section of this TMDL.

reported by: (1) the American and Mexican sections of the International Boundary and Water Commission (IBWC), and (2) Regional Board and IBWC personnel during binational monthly inspections and observations of the New River watershed in Mexicali.

At the International Boundary, New River fecal coliform concentrations range from 30,000 to more than 16,000,000 MPN/100 ml, and *E. coli* bacteria concentrations exceed 100,000 MPN/100 ml. Untreated discharges, improperly treated discharges, and bypasses are in violation of Minute No. 264. Table A.1, in Appendix A, shows fecal coliform results for the New River at the International Boundary, from 1975 through 1999.

2.4.2 BACTERIA IN THE NEW RIVER, DOWNSTREAM OF THE INTERNATIONAL BOUNDARY, IN VIOLATION OF WATER QUALITY OBJECTIVES

The New River receives additional bacteria from point and nonpoint pollution sources as the River flows northward through Imperial County to the Salton Sea. The River receives treated but undisinfected wastewater from multiple wastewater treatment plants (WWTPs), including the Date Garden Mobile Home Park WWTP, McCabe Union School District WWTP, Seeley County Water District WWTP, City of Brawley WWTP, and City of Westmorland WWTP. Secondarily treated undisinfected wastewater, such as that from the aforementioned WWTPs, may still contain significant numbers of pathogenic organisms, according to the California Department of Health Services. This is illustrated in Table 2.7, below.

Table 2.7 Bacteria and Viruses in Secondary Domestic Effluent[a]

Indicator Parameter	Minimum (MPN/100 ml)	Maximum (MPN/100 ml)
Fecal Coliforms	11,000	1,590,000
Fecal Streptococci	2,000	146,000
Virus	0.5	1,100

a. Table adapted from DHS (DHS 1987).

These undisinfected and improperly disinfected waste discharges, coupled with the overwhelming bacterial load from Mexico, cause the entire length of the New River downstream of the International Boundary to be impaired by fecal coliforms and *E. coli* bacteria. Tables B.1 and B.2, in Appendix B, show recent bacterial results for the New River and major drains discharging into the River.

Fecal coliform and *E. coli* concentrations were as high as 40,000 MPN/100 ml in April 2000, at the River's delta with the Salton Sea. Figures B.1 and B.2, in Appendix B, are graphs of recent fecal coliform and *E. coli* concentrations in the New River between the International Border and the Salton Sea. These concentrations violate Basin Plan water quality objectives (WQOs).

2.4.3 FECAL COLIFORMS AS INDICATORS OF PUBLIC HEALTH HAZARDS

Untreated and improperly treated domestic wastewater contain pathogens (e.g., bacteria and viruses) at concentrations that pose a significant risk to public health. Pathogen concentration in municipal raw sewage depends on such variables as available dilution, quantity and quality of industrial waste, community vaccination programs, and community disease patterns (DHS 1987). Table 2.8, below, shows typical microorganism concentrations in raw sewage.

Table 2.8 Bacteria and Virus Concentrations in Municipal Raw Sewage[a]

Indicator Organisms	Typical Concentrations (MPN/100 ml)
Total Coliform	10,000,000
Fecal Coliforms	3,000,000
Fecal Streptococci	500,000
Virus	500
Salmonella	100 - 10,000
Shigella	1 – 500
Helminths	1 – 100
Protozoa	10 – 200

a. Table adapted from DHS (DHS 1987).

Persons can be exposed to pathogens through ingestion of contaminated water, ingestion of food species (e.g., fish) infected by contaminated water, and invasion through skin contact with contaminated water. Diseases that can be spread by contact with contaminated surface water include salmonellosis (including typhoid and paratyphoid fevers), cholera, gastroenteritis from enteropathogenic *E. coli*, and shigellosis (USEPA 1986). Table C.1, in Appendix C, lists infectious agents potentially present in raw sewage and the diseases they can cause[4] (DHS 1987).

In 1978, the Imperial County Health Department issued a warning of the possibility of epidemics of typhoid, salmonella, or dysentery as long as the New River remains contaminated. The same year, mosquitoes in the New River area were found to harbor an encephalitis virus infectious to humans (Gruenberg 1998). Table 2.9, below, presents the ratios of pathogens and indicator organisms in municipal wastewater (DHS 1987).

Table 2.9 Pathogens Indicator Ratios[a]

Pathogen	Fecal Coliforms	Fecal Streptococci
Virus	$1:6x10^3$	$1:10^3$

[4]The listing is not all-inclusive. DHS recommends Feachem et al. 1980 and 1983 for a more comprehensive account of pathogenic agents and their waterborne diseases.

Pathogen	Fecal Coliforms	Fecal Streptococci
Salmonella	1:3x10^2 – 3x10^6	1:5x10^1 – 5x10^3
Shigella	1:6x10^3 – 3x10^6	1:10^3 – 5x10^5
Helminth	1:3x10^4 – 3x10^6	1:5x10^3 – 5x10^5
Protozoa cysts	1:1.5x10^4 – 3x10^5	1:2.5x10^3 – 5x10^4

a. Table adapted from DHS (DHS 1987).

Public warnings about contaminated water have been posted on the New River since 1978. Publicity probably has deterred people from coming into contact with River water and prevented disease outbreaks. However, people continue to fish in the New River downstream of the International Boundary.

Also, people routinely use the River to gain illegal access into the United States. Up to 120 people enter the U.S. via the New River each night, according to the U.S. Border Patrol. These people are immersed in and may incidentally ingest polluted water. Figure 2.4, below, shows people floating in the New River downstream of the International Boundary.

Fecal coliforms also were detected in the foam of the New River at the International Boundary. A foam sample tested by Regional Board staff in 1980 contained fecal coliforms of up to 700,000 MPN/100 ml. Wind can transport foam in the immediate vicinity, posing a public health hazard (U.S. Department of Health and Human Services 1996). Figure 2.5, below, shows foam in the New River near the International Boundary.

Figure 2.4 People Floating in the New River Downstream of the International Boundary

Figure 2.5 Foam in the New River Near the International Boundary

3. NUMERIC TARGET

The designated beneficial uses for the New River are freshwater replenishment (FRSH); water contact recreation (REC I); water non-contact recreation (REC II); warm freshwater habitat (WARM); wildlife habitat (WILD); preservation of rare, threatened or endangered species (RARE); and industrial service supply (IND). The REC I beneficial use requires the most stringent bacteria water quality objectives (WQOs), and includes such activities as swimming, wading, and fishing. Bacteria WQOs serve to protect human health from direct and indirect contact with sewage-contaminated water (USEPA Jan 1986; USEPA May 1986; USEPA Sep 1988; USEPA May 1998). The Regional Board adopted the USEPA-established WQOs into the Basin Plan.

Fecal coliforms, *E. coli*, and enterococci bacteria are used as indicator organisms for the Numeric Target. Monitoring water quality for specific pathogens is impractical because each pathogen requires a specific test, and these tests are not readily available in the Region. *Total* coliform bacteria are found in human and animal feces, and in soil, and are not considered useful pathogenic indicators. *Fecal* coliform and *E. coli* bacteria are associated with human and animal fecal waste, and are more representative of the sanitary quality of surface waters than are total coliform organisms (DHS 1987). High concentrations of fecal coliforms and *E. coli* indicate the high likelihood of infectious pathogens. Monitoring will focus on characterizing pathogen-indicator organisms and tracking compliance with numeric targets. Table 3.1, below, shows the numeric target for bacteria for the New River, as shown in the Basin Plan[5].

Table 3.1 Numeric Target for Bacteria for the New River

Indicator Parameter	30-Day Geometric Mean[a]	Maximum
Fecal Coliforms	200 MPN[b]/100ml	c
E. coli	126 MPN/100 ml	400 MPN/100 ml
Enterococci	33 MPN/100 ml	100 MPN/100 ml

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

These concentrations are proposed as the goal for the New River, and contain a margin of safety. Progress in attaining this goal will be gauged by the implementation of management and mitigative actions in accordance with this TMDL.

[5] Commercial testing for fecal enterococci is not available within the Region. Therefore, Regional Board waste discharge requirements generally specify that fecal coliforms and *E. coli* bacteria be used as water quality indicators for pathogens.

4. SOURCE ANALYSIS OF BACTERIA IN THE NEW RIVER

This section identifies and evaluates various potential and actual pathogen sources in the New River Watershed. Sources fall into two categories: human-made and natural. Human-made sources in the U.S. consist of: (a) wastewater treatment plants (WWTPs) discharging wastewater under the National Pollutant Discharge Elimination System (NPDES), (b) agricultural return flows, (c) potential discharges from confined animal feeding operations (CAFOs), and (d) urban runoff. Human-made pathogen sources can negatively impact water quality and cause diseases in humans[6]. Natural pathogen sources may also be significant causes of human disease[7]. Natural sources are wildlife, stormwater runoff, and wind deposition. Fecal coliform bacteria and *E.* bacteria are found naturally in the intestinal tracts of animals and therefore indicate fecal contamination when found in water (Christensen et al. 1996; Fayer 2001).

The New River waters at the International Boundary consist of wastewaters from point and non-point sources of pollution in the Mexicali Valley, Mexico. The various pathogen sources in the U. S. are discussed in detail in the following sections. The two sources that contribute the greatest pathogenic pollutant load to the New River are the NPDES facilities and the wastewater originating in Mexico. Figure 4.1, below, illustrates the various sources of bacteria.

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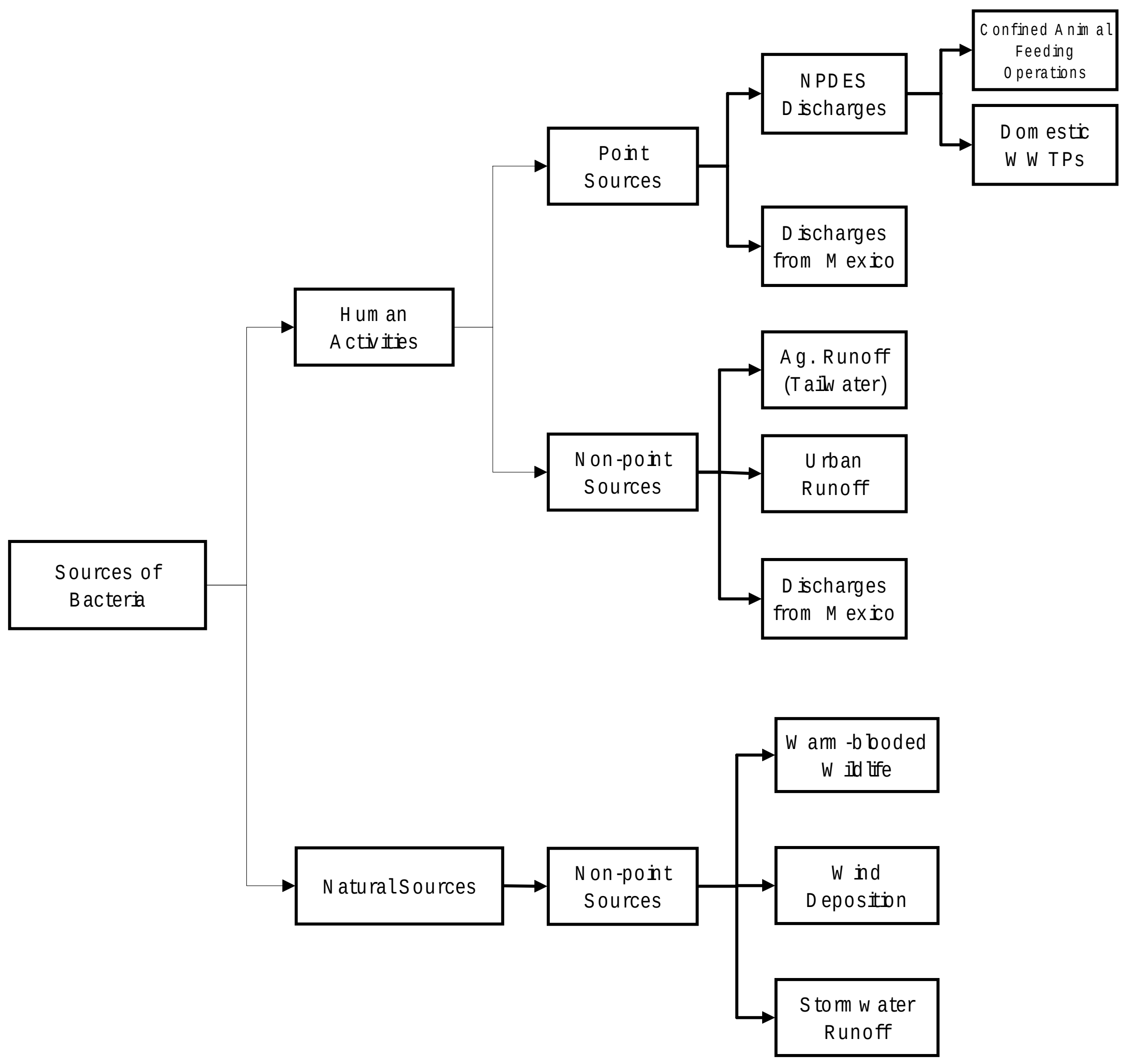
[6] The parasite *Cryptosporidium parvum,* which causes the disease cryptosporidiosis in humans, is found in human-made and in natural sources of pathogens. The infamous 1993 outbreak of cryptosporidiosis in Milwaukee, which caused 104 deaths, has been linked to sewage contamination of the city's drinking water supply (Purdue University 1996; Eisenberg et al. 1998; Morris et al. 1998).

[7] Pathogens harmful to humans may not be infectious or harmful to wildlife species such as birds.

Figure 4.1 Actual Sources and Potential Sources of Bacteria in the New River



Estimating pollutant source contributions for bacteria is signifigantly different than performing the same analysis for other pollutants such as sediment, pesticides, or nutrients. This is because bacteria loadings are measured as a density-based Most Probable Number (MPN) for a given volume of water (i.e., 100 ml in this TMDL), which can be thought of as a concentration[8]. Other pollutants such as sediment, pesticides, and nutrients are generally expressed as mass-based measurements (i.e., pounds per day). This means that bacteria source measurements reveal the most probable concentration at any given point in time[9], not the amount of bacteria a discharger "produces." A mass-based bacteria measurement would be misleading because a discharger typically contributes not only bacteria to a waterbody, but also organic material which could lead to further bacteria growth. If mass-based bacteria measurements from dischargers were to be calculated, the total mass should include bacteria growth arising from discharged organic material.

Studies have been conducted since the 1930s regarding regrowth of indicator organisms in sewage effluents after: (a) dilution with fresh water, (b) storage, (c) disinfection, and (d) discharge to a waterbody. In one study, substantial regrowth of coliform organisms occurred in secondary effluent that had received 1 mg/L of chlorine. However, in higher doses of chlorine (1-5 mg/L), no substantial regrowth occurred because of nutrient deficiency and presence of residual chlorine (DHS 1987). Other variables like salinity and temperature affect regrowth.

Regrowth is not constant even for indicators of the same species under the same environmental conditions. For example, a mixture of 1% undisinfected primary effluent and Sacramento River water showed a 40-fold increase in total coliform bacteria, but only a 6-fold increase in fecal coliform bacteria (DHS 1987). Another study documented that total coliforms of $5x10^6$ MPN/100 ml within trickling filter effluent dropped to 120 MPN/100 ml after chlorination, and increased to 800 MPN/100 ml after 3 days of storage (Shuval et al. 1973).

A time lag occurs before bacteria begin utilizing discharged organic matter for respiration. The amount of organic matter begins to decrease in conjunction with an exponential increase in bacteria. After a period of time, the bacteria reach their peak growth attributable to the original discharge (which may have occurred several miles upstream). When the last of the organic matter is consumed, the bacteria eventually die off. In cases where only one point of discharge exists, the source load contribution could be estimated as the concentration of bacteria at peak growth.

The New River situation is much more complex because: (a) multiple discharge points occur along the River, and (b) bacteria sources from upstream cumulatively affect bacteria concentrations downstream. For example, a bacteria population at the International Boundary may be dying off, until discharges from a U.S. wastewater treatment plant add organic matter to the New River, allowing the bacteria population to grow. A measurement taken downstream of this plant would likely show a higher bacteria concentration than it would have without the 'leftover' bacteria from Mexico. Therefore, measuring bacteria concentrations upstream and downstream of a discharger without considering the river system as a whole may attribute contributions to the wrong source. For this reason, a qualitative description of the river system helps to quantify the various source contributions for the purpose of the Source Analysis

[8] The terms "density" and "concentration" are interchangeable in this document.

[9] It is possible to calculate the total number of indicator bacteria discharged into the New River, based on the total volume of wastewater discharged by each source. However, this would have little regulatory significance because bacterial WQOs are expressed as concentrations.

Section of this document.

To determine the New River's current bacterial loading, Regional Board staff repeatedly sampled 16 locations along the River from the International Boundary to the River's terminus at the Salton Sea, as well as major Ag Drains tributary to the River. Regional Board staff will conduct additional monitoring, using a phased approach. Table 4.1 below describes the sampling stations along the New River, while Figure 4.2 shows their locations. Appendix B contains the bacterial results.

Table 4.1 Sampling Locations for New River

Sampling Station	Description
NR-1	Calexico USGS monitoring station for the New River, located at the International Boundary.
NR-2	New River monitoring station, located approximately 380 feet downstream of the outfall from the City of Calexico WWTP.
NR-3	New River monitoring station, located approximately 1,300 feet downstream of the intersection of the New River and the All American Canal, downstream from the Calexico WWTP and upstream from the Calexico SWDS.
NR-4	New River monitoring station, located approximately 650 feet downstream of the intersection of the New River and Highway 98, about 1000 feet downstream from the Calexico SWDS.
NR-5	New River monitoring station, located immediately downstream of the intersection of the New River and Ferrell/La Brucherie Road Bridge.
NR-6	New River monitoring station, located immediately upstream of the intersection of the New River and Brockman Road Bridge.
NR-7	New River monitoring station, located immediately upstream of the intersection of the New River and Evan Hewes Road Bridge.
NR-8	New River monitoring station, located approximately 860 feet downstream of the aeration structure, about 500 feet downstream of the intersection of the New River and Evan Hewes Road Bridge.
NR-9	New River monitoring station, located approximately 2,500 feet upstream of the Navy Air Station Wastewater Treatment Plant outfall (i.e., upstream of the Imperial SWDS), on the west bank of the New River.
NR-10	New River monitoring station, approximately 380 feet downstream of the intersection of the New River and Worthington Road Bridge (i.e., downstream of the Imperial SWDS), on the east bank of the New River.
NR-11	New River monitoring station, located immediately downstream of the intersection of the New River and Keystone Road Bridge.

Sampling Station	Description
NR-12	New River monitoring station, located immediately upstream of the intersection of the New River and Western Hovley Road Bridge (i.e., upstream of the Brawley SWDS).
NR-13	New River monitoring station, located at a point approximately 1,100 feet downstream from the Brawley SWDS.
NR-14	New River monitoring station, located immediately downstream of the intersection of the New River and Brandt Road Bridge.
NR-15	New River monitoring station, located immediately upstream of the intersection of the New River and Lack Road Bridge.
NR-16	North bank of the New River just prior to discharge into the Salton Sea, approximately 1 mile northwest of Lack Road Bridge.

4.1 POINT SOURCES IN THE U.S.

4.1.1 NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) WASTEWATER TREATMENT PLANTS

Nine facilities currently discharge pollutants into the New River pursuant to the National Pollutant Discharge System (NPDES) program. Eight of these NPDES facilities are wastewater treatment plants (WWTPs) discharging domestic wastewater. The other NPDES facility is the Second Imperial Geothermal Company (SIGC), which is permitted to discharge 0.8 mgd of cooling tower blowdown water indirectly into the New River via the Beech Drain. Therefore, this facility is not considered to be a pathogen source requiring further evaluation.

Three WWTPs discharge secondarily treated, *disinfected* domestic wastewater into the New River directly or via tributaries, while the other five WWTPs discharge secondarily treated, *undisinfected* domestic wastewater. Table 4.2, below, lists the NPDES facilities, along with their flows and discharge locations. (Facilities discharging secondarily treated and disinfected wastewater are shown in normal type. Facilities discharging secondarily treated, but undisinfected wastewater are shown in ***bold italic*** type.)

Table 4.2 Domestic NPDES WWTPs Discharging Wastewater into New River

Discharger	Approx. Avg. Flow (mgd)	Discharge Location	Discharger[10] Classification
U.S. Navy Facility, El Centro	0.11	New River, about 1000 feet upstream of Worthington Road Bridge	Minor
City of Calexico, 298 East Anza Road, Calexico	3.0	New River, about 1.5 miles downstream of the International Boundary	Major
Centinela State Prison, 2302 Brown Road, Imperial	0.6	Dixie Drain 1-C, which flows about 6 miles before it discharges into the New River	Minor
City of Westmorland, 5295 Martin Road, Westmorland	***0.16***	***Trifolium Drain No. 6, at a point 3.6 miles upstream of where the Trifolium Drain discharges into the New River***	***Minor***
Seeley County Water District, 1898 West Main Street, Seeley	***0.13***	***New River, about 1500 feet downstream of Evan Hewes Road Bridge***	***Minor***
City of Brawley, 400 Main Street, Brawley	***3.15***	***New River, at a point 47 miles north of the International Boundary.***	***Major***
Date Gardens Mobile Home Park, 1020 W. Evan Hewes Hwy., El Centro	***0.01***	***Rice 3 Drain, at a point 7 miles upstream of where the Rice 3 Drain discharges into the New River***	***Minor***
McCabe Union School District, 701 West McCabe Rd., El Centro	***0.0015***	***Wildcat Drain, at a point 3 miles upstream of where the Wildcat Drain discharges into the Rice 3 Drain. Following the junction of the Wildcat Drain with the Rice 3 Drain, the Rice 3 Drain flows for another 7 miles before it discharges into the New River***	***Minor***

[10] Classification based on volume of flow discharged and USEPA Guidelines.

The City of Calexico generally has been in compliance with disinfection limits since late 1998 when the City began disinfecting its WWTP effluent. The Centinela State Prison WWTP, located in Imperial, has been noncompliant with disinfection limits and had a sewage spill since last year (2000). Because of this, the Executive Officer issued two separate administrative civil liability complaints against the prison. The U.S. Navy Facility in El Centro historically has been noncompliant with disinfection limits, but recently upgraded its WWTP. Table 4.3, below, shows bacterial data submitted by the remaining five non-disinfecting WWTPs. Figure 4.2 on page 27 shows their locations.

Table 4.3 Bacterial Data for NPDES WWTPs Discharging Undisinfected Effluent

Discharger	Total Coliform Organisms MPN/100 ml (Max/Min/GeoM)	Fecal Coliforms Organisms MPN/100 ml (Max/Min/GeoM)	E. coli MPN/100 ml (Max/Min/GeoM)
City of Westmorland WWTP	35,000 9,000 18,722[a]	5,000 1,700 3,752	NR[b]
Seeley County Water District WWTP	80,000 500 21,078	23,000 240 7,366[a]	23,000 240 1,867[a]
City of Brawley WWTP	>1,600,000 30,000 77,460[a]	>1,600,000 24,000 34,289[a]	80,000 2,300 24,303
Date Gardens Mobile Home Park WWTP	>16,000 7,000 8,997[a]	>16,000 800 2,436[a]	NR
McCabe Union School District WWTP	30,000 >16,000 25,114[c]	13,000 7,000 9,539[c]	NR

a. Data is based on four samples due to insufficient quantification of one sample, recorded as >16,000 MPN/100 ml for the City of Westmorland, <2,000 MPN/100 ml for Seeley County Water District, >1,600,000 MPN/100 ml for the City of Brawley, and >16,000 MPN/100 ml for Date Gardens Mobile Home Park.

b. Not reported.

c. Data is based on three samples due to the loss of one sample and the insufficient quantification of another sample recorded as >16,000 MPN/100 ml.

The data presented in Table 4.3 above and in Table 2.4 (p. 8) indicate that WWTPs are significant sources of bacteria and, therefore, significant sources of pathogens. The high concentrations of fecal coliforms and *E. coli* indicate the high likelihood of the presence of human infectious pathogens. These WWTPs discharge bacteria in concentrations that contribute to WQS violations.

4.1.2 CONFINED ANIMAL FEEDING OPERATIONS (CAFOS)

Confined Animal Feeding Operations (CAFOs) are defined as "any place where cattle, calves, sheep, swine, horses, mules, goats, fowl, or other domestic animals are corralled, penned, tethered, or otherwise enclosed or held and where feeding is by means other than grazing" (California Code of Regulations Title 27). Nine CAFOs exist within the U.S. portion of the New

River watershed. These CAFOs are governed by Board Order No. 01-800 (General NPDES Permit and General Waste Discharge Requirements for Confined Animal Feeding Operations). CAFO facilities are listed in Table 4.4, below.

Table 4.4 Confined Animal Feeding Operations in the New River Watershed

Site, Address, and Map Reference Number	Maximum Number of Animals Confined	Distance to the New River or a tributary	Bacterial Threat to New River[11]
Brandenburg Feed Yard 903 West Highway 98, Calexico, 1	5,000	Adjacent to Greeson Drain	Moderate
New River Cattle 420 West Kubler Road, Calexico, 2	9,500	Adjacent to New River	High
Phillips Cattle Co. 910 Nichols Road, El Centro, 3	12,000	Adjacent to New River	High
Meloland Cattle Co. 907 Brockman Road, El Centro, 4	15,000	Adjacent to Wisteria Drain	Moderate
Jackson Feedlot 495 West Heber Road, El Centro, 5	11,000	1.5 miles	Low
El Toro Land and Cattle Co. 96 East Fawcett Road, Heber, 6	30,000	2 miles	Low
Kuhn Farms Dairy 1870 Jeffery Road, El Centro, 7	2,453	Adjacent to Dixie Drain #4	Moderate
Cameiro Heifer Ranch 195 West Corey Road, Brawley, 8	5,500	2 miles	Low
Ruegger and Ruegger Feedlot 604 Bannister Road, Westmorland, 9	3,000	Adjacent to Timothy Drain	Moderate

Figure 4.2, page 27, shows the location of WWTPs, CAFOs, and sampling stations in the U.S. portion of the New River Watershed.

[11] Threat estimates are based on site's size and proximity to surface water.

The significance of these specific CAFO facilities as New River pathogen sources is currently unknown. However, CAFOs are known pathogen sources to surface water and groundwater (Kreis et al. 1972). Fecal coliform concentrations as high as 100,000,000 MPN/100 ml have been detected in CAFO wastewater (Kreis et al. 1972). Possible contamination routes include groundwater infiltration and conveyance, and transport by stormwater runoff. Infiltration and conveyance seem more likely[12] in the Imperial Valley because of the low amount of precipitation.

Bacteria concentrations increased and decreased between several New River sampling stations in 2000, among the 16 stations within the U.S. The difference is not statistically significant, but suggests the potential for bacteria regrowth and/or presence of other bacteria sources. For example, the Ferrell Road and Brockman Road sampling stations revealed that fecal coliform and *E. coli* concentrations (Geometric Mean) at the downstream station (Brockman Road) were greater than the upstream station (Ferrell Road), up to five times greater for fecal coliforms for five of six sampling events, and up to three times greater for *E. coli* for four of five sampling events (Table 4.5, below). Potential bacteria sources in this River segment are three known agricultural drains that discharge into the River, and the Phillips Cattle Company and New River Cattle Company, both located immediately adjacent to the River (Figure 4.3, below). Imperial Valley's arid climate, low rainfall, and very fine-grained soils diminish CAFO potential to significantly impact receiving waters. Current data is insufficient to make statistically significant inferences between stations, but does reveal an overall trend of decreased bacteria concentrations as the River progresses to its outlet with the Salton Sea. Additional monitoring is required to better identify bacteria source(s) and make statistically significant determinations.

Table 4.5 New River Bacterial Concentrations at NR-5 and NR-6

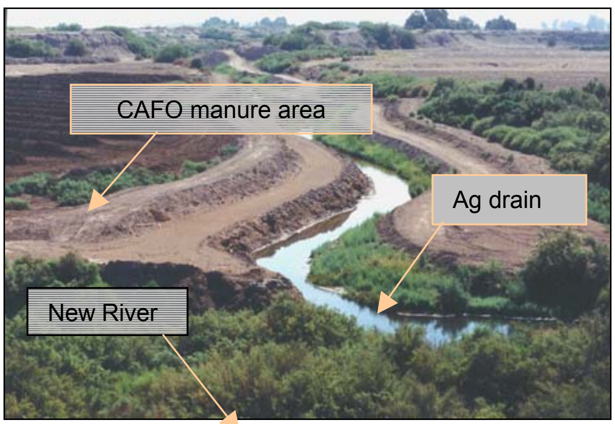
		Fecal (MPN/100 ml)		*E. coli* (MPN/100 ml)	
Drain	**Month**	**Geometric Mean**	**Maximum**	**Geometric Mean**	**Maximum**
Ferrell Road (NR-5)	Jan	65,885	130,000	NA [a]	NA
	Feb	64,151	110,000	36,342	60,000
	Mar	223,871	300,000	155,458	170,000
	Apr	176,239	230,000	50,397	80,000
	May	NA	NA	NA	NA
	Jun	687,534	1,300,000	447,642	1,300,000
	July	435,330	500,000	242,724	500,000
Brockman Road (NR-6)	Jan	155,458	170,000	NA	NA
	Feb	320,753	500,000	95,901	140,000
	Mar	700,000	700,000	229,019	260,000

[12] CAFOs that do not have young stock are of substantially less risk to microbial water quality compared to operations that do have calves. A beneficial management practice of stacking manure for 3 to 6 weeks can dramatically reduce the pathogen load/kg of manure.

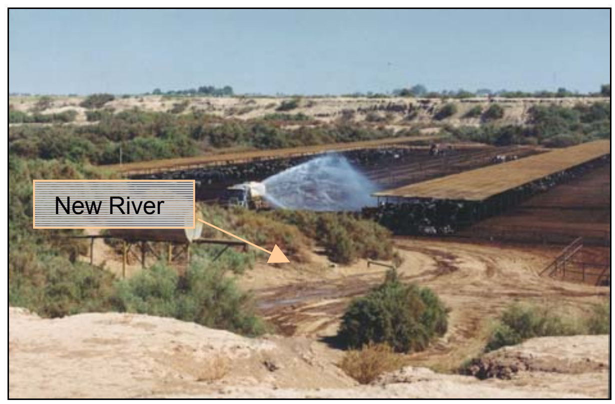
Drain	Month	Fecal (MPN/100 ml) Geometric Mean	Fecal (MPN/100 ml) Maximum	*E. coli* (MPN/100 ml) Geometric Mean	*E. coli* (MPN/100 ml) Maximum
	Apr	355,689	500,000	94,354	300,000
	May	NA	NA	NA	NA
	Jun	269,390	500,000	169,410	220,000
	July	559,877	5,000,000	479,867	5,000,000

a. Not Analyzed

Figure 4.2 Phillips Cattle Co. and New River Cattle Co.



Phillips Cattle Company



New River Cattle Company

4.2 NON-POINT SOURCES IN THE U.S.

4.2.1 AGRICULTURAL RUNOFF

The New River is sustained mainly by agricultural return flows from the Imperial Valley and the Mexicali Valley in Mexico. Most of the agricultural flows in the Imperial Valley reach the river via agricultural drains operated and maintained by the Imperial Irrigation District (IID). Flood irrigation is the typical irrigation method practiced in the Imperial Valley. Water that runs over the field to the drain without percolating into the soil is called tailwater and has the potential to transport bacteria to the drains.

Tailwater potentially picks up bacteria from such agricultural activities as livestock grazing, application of dried animal manure fertilizer, and irrigation events that attract hungry defecating birds to insects driven from soil. Figure 4.5, adjacent, shows agricultural tailwater.

Figure 4.3 Agricultural Tailwater

Data from major drains in 2000 reveal measurable bacteria loading in some drains (Table 4.6, below). However, the exact source of the loads is difficult to determine without a more detailed sampling program. For example, the McCabe Union School District WWTP and Date Gardens Mobile Home Park WWTP discharge undisinfected domestic wastewater indirectly and directly, respectively, into the Rice 3 Drain, a New River tributary. Effluent analyses from these facilities indicate bacteria concentrations that significantly exceed WQOs. Results for the Rice 3 Drain were influenced by these WWTPs, but also may have been influenced by unidentified sources or regrowth processes. Quantifying exact bacteria sources is not practical because of the River's extreme pollution levels. Table 4.6, below, shows bacteria concentrations in major drains during 2000.

Table 4.6 Bacterial Concentrations in Major Drains During 2000

		Fecal Coliforms (MPN/100 ml)		*E. coli* (MPN/100 ml)	
Drain	**Month**	**Geometric Mean**	**Maximum**	**Geometric Mean**	**Maximum**
Greeson	Jan	ND[13]	ND	NA[14]	NA
	Feb	ND	ND	ND	ND
	Mar	55	80	33	70
	Apr	48	80	6	7
	May	NA	NA	NA	NA
	Jun	**256**	**900**	126	220
	July	**324**	**700**	**139**	220
Fig	Jan	ND	ND	NA	NA
	Feb	ND	ND	ND	ND
	Mar	**367**	**900**	50	110
	Apr	90	300	26	50
	May	NA	NA	NA	NA
	Jun	23	30	16	17

[13] ND = Not detected.

[14] NA = Not analyzed.

		Fecal Coliforms (MPN/100 ml)		*E. coli* (MPN/100 ml)	
Drain	**Month**	**Geometric Mean**	**Maximum**	**Geometric Mean**	**Maximum**
	July	12	80	12	80
Flax	Jan	ND	ND	NA	NA
	Feb	ND	ND	ND	ND
	Mar	3	4	ND	ND
	Apr	66	110	46	110
	May	NA	NA	NA	NA
	Jun	171	210	**162**	210
	July	3	20	<2	<2
Rice 3	Jan	**1776**	**140000**	NA	NA
	Feb	ND	ND	ND	ND
	Mar	3	4	3	4
	Apr	**256**	**500**	27	34
	May	NA	NA	NA	NA
	Jun	**13446**	**17000**	**12092**	**17000**
	July	**3175**	**4000**	**3175**	**4000**

4.2.2 STORMWATER RUNOFF

Stormwater runoff is a product of intense storm events, and has the capacity to cause large-scale erosion in vulnerable areas. Most stormwater runoff draining into the New River comes from farmland, roads, and Valley communities. The actual bacteria/pathogen contribution from the stormwater runoff of these entities is unknown. However, intense storm events are uncommon, as the Valley has an annual average precipitation of about 2.5 inches. Stormwater runoff from the Imperial Valley area accounted for less than 0.8% of the New River's flow in 1994 through 1999 (California Regional Water Quality Control Board 2000). Most runoff percolates into the ground, evaporates, or is discharged into WWTPs (see Section 4.2.4, below). Therefore, stormwater runoff is not a significant bacteria/pathogen source, unless the stormwater comes in contact with animal manure fertilizer.

4.2.3 URBAN RUNOFF

Urban runoff is non-stormwater runoff originating from human urban activities, such as landscape irrigation and car washing. Urban runoff drains into tributaries or a river itself. Westmorland, Calexico, and the unincorporated community of Seeley do not have urban runoff collection and conveyance systems. However, several local places do have an urban runoff collection and conveyance system, including: (a) the Calexico Airport, discharging directly into the New River, (b) Brawley, discharging 60% to the New River and 40% to the WWTP (Phone Conversation with WWTP Personnel 2000), and (c) El Centro Naval Air Station, discharging to the New River (Phone Conversation 2000).

Urban runoff is known to carry bacteria. However, urban runoff is more likely to evaporate or infiltrate into the ground than to end up in the New River, due to the local arid climate and low level of urbanization. (Urbanization is present in less than 0.5% of the New River drainage area.) Therefore, the fate of urban runoff parallels that of stormwater runoff—that is, urban runoff is not a significant bacteria/pathogen source.

4.2.4 NATURAL SOURCES (WILDLIFE AND WIND DEPOSITION)

Natural sources of bacteria/pathogens include warm- and cold-blooded wildlife and wind deposition. These sources can contribute pathogens into the New River directly and indirectly via agricultural drain water. For example, turtles live in the New River. Also, local and migratory birds as well as other wildlife use farmland for sustenance, particularly farmland with grain crops. To what degree these natural sources contribute bacteria to the New River is unknown, but their contribution is believed to be insignificant relative to other point sources from the U.S. and Mexico. Characterizing the contribution from these sources will be extremely difficult until the high bacteria counts at the International Boundary and other key places (e.g., Brawley and Westmorland) are reduced significantly.

4.2.5 OTHER SOURCES

Bacteria densities vary by location along the New River. The increases are especially noticeable: (a) downstream of the Calexico Landfill at the intersection of the New River and Highway 98 (sampling station NR-4); (b) at the intersection of the New River and Brockman Road Bridge (sampling station NR-6), as discussed in Section 4.1.2; and (c) immediately downstream of the intersection of the New River and Keystone Bridge (sampling station NR-11). Tables B.1 and B.2 in Appendix B display the increases. Figure 4.6, below, shows the New River by the landfill. Table 4.7, below, shows bacteria densities upstream of (NR-3) and downstream of (NR-4) the landfill and Highway 98 culvertat, during 2000.

Figure 4.4 New River Immediately Upstream of Highway 98

Table 4.7 Bacterial Concentrations Upstream and Downstream of Highway 98 Culvert

		Fecal (MPN/100 ml)		E. coli (MPN/100 ml)	
Location	**Month**	**Geometric Mean**	**Maximum**	**Log Mean**	**Maximum**
New River Upstream of Landfill and Culvert (NR-3)	Jan	25,198	40,000	NA*	NA
	Feb	88,959	110,000	60,732	80,000
	Mar	85,086	110,000	67,533	110,000
	Apr	157,231	230,000	50,397	80,000
	May	NA	NA	NA	NA
	Jun**	242,610	340,000	200,764	340,000
	July	804,145	1,300,000	407,163	500,000
New River Downstream of Landfill and Culvert (NR-4)	Jan	63,496	80,000	NA	NA
	Feb	95,973	170,000	48,203	70,000
	Mar	185,257	220,000	119,208	140,000
	Apr	162,626	230,000	44,480	110,000
	May	NA	NA	NA	NA
	Jun	228,305	500,000	159,346	170,000
	July	650,296	1,100,000	263,041	500,000

NA = Not analyzed.

The data in Table 4.7, above, does not conclusively determine the sources or processes for bacteria increases at the NR-3 and NR-4 sampling stations. However, the data suggest that nutrient/organic loading from Mexicali and other sources may contribute to bacteria regrowth and, thus, WQO violation. NR-4 results are two times greater than NR-3 results upstream. Potential bacteria sources in this river segment include the Imperial County Calexico Solid Waste Disposal Site (SWDS) and trash from Mexico. A significant amount of bulk trash gets entangled at a culvert upstream of NR-4, immediately east of Calexico SWDS. County staff remove up to 200 cubic yards of accumulated trash every six months. Bacteria thrive at this location due to nutrients in the water column and in the trash, and the septic condition of the New River.

Like the N-4 sampling station, NR-11 also has more bacteria than the station upstream (NR-11) (Tables B.1 and B.2 in Appendix B). There are no known point sources in this River segment. Potential bacteria sources include: (a) several Ag Drains discharging into the River, and (b) sewage from isolated residences not connected to community sewers, that may be entering the Ag Drain system. Most of these isolated residences utilize septic tanks for sewage disposal. However, septic tanks do not function well in Imperial Valley's clay soil, which could cause some individuals to illicitly dispose of their sewage. Special monitoring activities may be required to investigate these potential pollution sources.

Like the natural sources discussed in Section 4.2.4, characterizing the contribution from these other sources will be extremely difficult until the high bacteria counts at the International Boundary and other key places (e.g., Brawley and Westmorland) are reduced significantly.

4.3 KNOWN SOURCES IN THE MEXICALI VALLEY, MEXICO

Point and nonpoint sources from the Mexicali Valley contribute to New River bacteria pollution. Nonpoint sources of pollution primarily consist of agricultural return flows and urban runoff. Point sources of pollution include wastewater treatment lagoons, the sewage collection and conveyance system, industrial discharges, and CAFOs.

Sewage service for the Mexicali metropolitan area is divided into the Mexicali I and Mexicali II service areas. Mexicali I includes most of the old, well-established neighborhoods to the west, and the city's existing sewage collection and treatment system excluding the Gonzalez-Ortega lagoon system. Mexicali I uses the Zaragoza lagoon system as its wastewater treatment plant (WWTP). Mexicali II includes the new residential and industrial development areas to the east, and uses the Gonzalez-Ortega lagoon system as its WWTP. Mexicali II also has a proposed 20-mgd WWTP under construction.

The City of Mexicali is undergoing unprecedented growth. Its population is expected to increase at 2.6% per year (INEGI 2000). However, Mexicali lacks an adequate sewage collection and treatment system for current and projected flows. It currently is served by two systems of stabilization lagoons, both of which lack disinfection facilities. The systems have a combined total rated design capacity of about 20 to 25 mgd, but sewage flows were 35 to 40 mgd in 1997 (CH2M Hill 1997). A Mexicali II collection and treatment system with a rated capacity of 20 mgd is under construction to accommodate eastern Mexicali. Completion of the new treatment system is expected by late 2002. However, the new system does not include disinfection facilities. Figure 4.8, on page 35, shows the Mexicali I and II service areas, key sewage infrastructure, the New River and its main tributaries in Mexicali, and key known industrial facilities discharging into the watershed.

Most of the International Boundary bacteria load is related to Mexicali's inadequate sewage infrastructure (e.g., pumping plants and principal sewer lines). Anywhere from 5 to 25 mgd of raw municipal sewage are discharged into the New River daily. Table 4.8, below, lists known and potential bacteria sources in the Mexicali Valley. The table is based on Regional Board and IBWC reports on monthly observation tours of the New River watershed in Mexicali and of the main sewage infrastructure. The table is not all-inclusive[15], but does provide a picture of the overall threat to New River water quality.

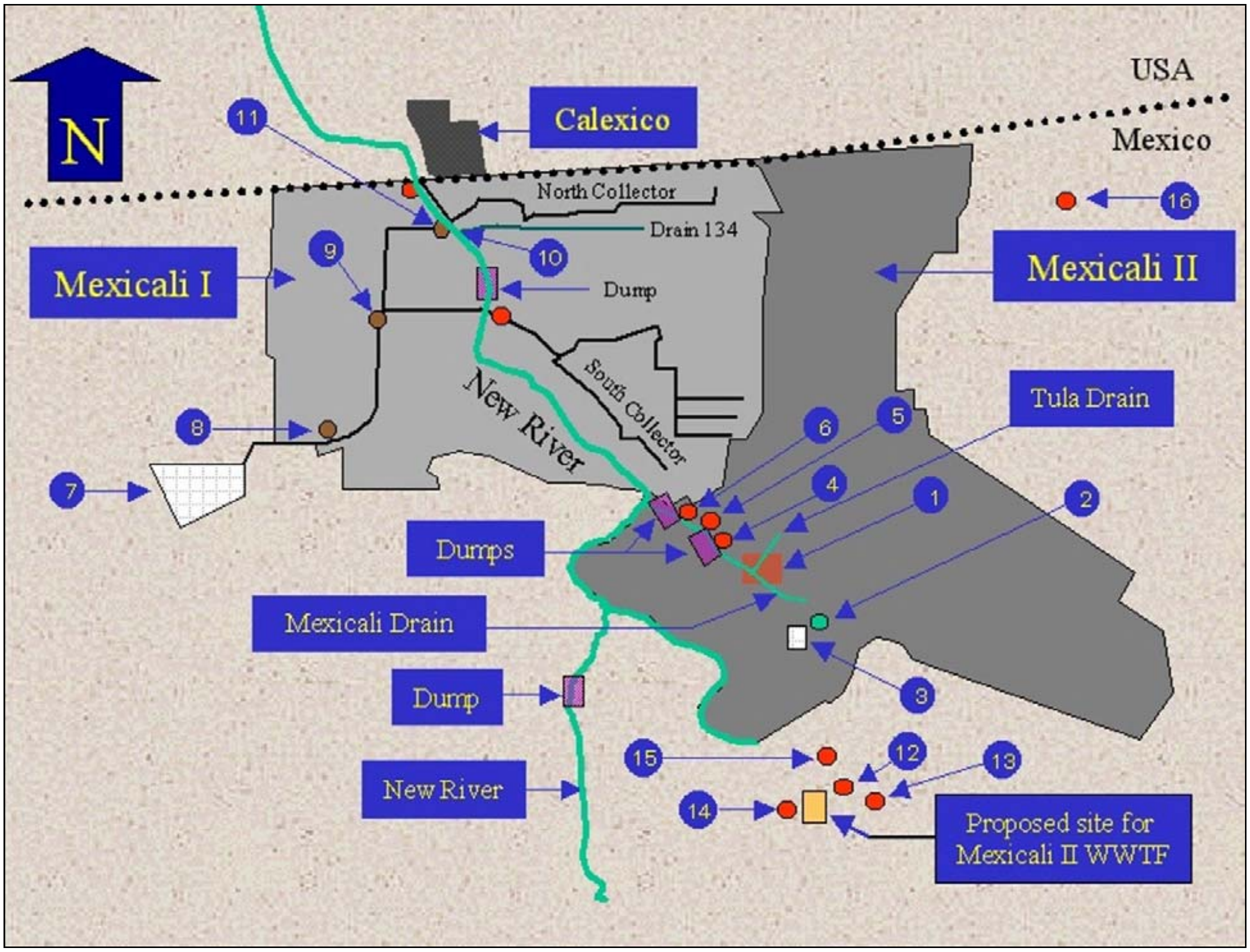
[15] Observation tours indicate that a significant number of outhouses and CAFOs discharge into the New River watershed in Mexicali.

Table 4.8 Known Mexican Sources of Bacteria

Source	Approx. Potential Volume (mgd)	Type of Wastes			Potential Fecal Coliforms (MPN/100 ml)
		Municipal Raw Sewage	Undisinfected Wastewater	Industria l Wastes	
Drain 134	5.0	X		X	3.0×10^6 (a)
Pumping Plant No. 1	15.0	X			9.2×10^6 (b)
Pumping Plant No. 2	5.0-7.0	X			9.2×10^6 (b)
Pumping Plant No. 3	5.0	X			9.2×10^6 (b)
Pumping Plant No. 5	0.1-0.9	X			9.2×10^6 (b)
Mexicali II Collector	5.0	X			1.2×10^7 (b)
Nutrimex Collector	3.0	X			7.5×10^6 (b)
Gonzalez-Ortega Pumping Plant	3.0	X			1.7×10^6 (b)
Left Bank Collector	0.5-1.0	X			3.0×10^6 (a)
Right Bank Collector	0.5-1.0	X			3.0×10^6 (a)
Right Bank Pumping Plant	1.0	X			3.0×10^6 (a)
Gonzalez-Ortega Lagoons (Mexicali II WWTP)	3.0		X		8.0×10^6 (b)
Zaragoza Lagoons (Mexicali I WWTP)	25-35		X		2.0×10^6 (b)
Tula West Drain	6.5	X		X	3.0×10^6 (a)

(a) Based on DHS 1987
(b) Based on CH2M Hill 1997

Figure 4.5 Main Sewage Infrastructure in the Mexicali Metropolitan Area



1. Industrial Area: Hidrogenadora Nacional (Conasupo), Quimica Organica, Quipac, Vitromex	7. Zaragoza Lagoons (Mexicali I WWTP)	13. Steel recycling plant
2. Gonzalez-Ortega Lift Station	8. Pumping Plant No. 3	14. Slaughterhouse discharge
3. Gonzalez-Ortega Lagoons (Mexicali II WWTP)	9. Pumping Plant No. 1	15. Maseca
4. Kenmex	10. Drain 134	16. Fabrica de Papel San Francisco
5. Collector Mexicali II bypass	11. Pumping Plant No. 2 and Right Bank Lift Station	
6. Collector Nutrimex bypass	12. Hog farm discharge	

The Mexicali I and II WWTFs do not disinfect effluent and are, therefore, a major source of bacteria pollution as shown in the Table 4.8, above. The proposed Mexicali II WWTF lacks disinfection facilities and is, therefore, a major source of future bacteria pollution.

Data for the New River at the International Boundary reveal that fecal bacteria concentrations fluctuate from the mid 50,000s to greater than 16,000,000 MPN/100 ml (Table A.1 in Appendix A). This is an overall decline, but a significant public health threat still exists, and bacteria WQOs are still violated.

Overall bacteria densities in the New River are related directly to the amount of raw sewage flowing from the Mexicali area. For example, Mexicali discharged 5 to 20 mgd of raw sewage into the River daily from January to May 2000 because major collectors were off-line. When some of these discharges were rectified in May 2000, bacteria concentrations decreased significantly throughout the length of the River. However, bacteria concentrations were still very high within about the first 20 miles of the River, and seemingly spiked due to U.S. sources (Appendix B).

4.4 RECOMMENDED ACTIVITIES FOR REFINEMENT OF SOURCE ANALYSIS

Additional sampling of Imperial Valley Ag Drains is necessary to better quantify impacts on the New River from natural sources and anthropogenic nonpoint sources of pollution. Of particular concern are the areas of the Brockman Road and Keystone Road bridges. However, it will be difficult to measure acute impacts from point (e.g., CAFOs) and nonpoint sources (e.g., agricultural drainage) until discharges from WWTPs and Mexico are controlled.

A continuous monitoring program is necessary at the International Boundary and various sampling stations along the New River in Imperial Valley, to better define the magnitude and characteristics of the bacteria problem. Monitoring activities are part of this TMDL's Implementation Plan, and are expected to result in future TMDL refinement as more data becomes available. The Implementation Plan outlines a task schedule for completion.

5. WASTELOAD AND LOAD ALLOCATIONS

USEPA TMDL guidelines (USEPA 1991) define the maximum allowable pollutant load as the total load of a particular pollutant that can be present in a waterbody while still attaining and maintaining designated beneficial uses. The maximum allowable pollutant load is reduced by a margin of safety. The remaining allowable pollutant load is allocated to point pollution sources (Wasteload Allocation, WLA) and nonpoint pollution sources (Load Allocation, LA).

5.1 WASTELOAD AND LOAD ALLOCATIONS

Organism density (i.e., number of organisms in a given volume of water) is more significant than organism mass (i.e., pounds per day) regarding the protection of public health and beneficial uses. (Pathogens are not controlled readily on a mass basis.) Therefore, this TMDL establishes density-based WLAs for point sources and LAs for nonpoint sources[16], expressed in terms of fecal coliforms, *E. coli*, and enterococci organisms. These allocations are to be attained on the New River by June 2004. Table 5.1, below, shows the allocations.

Table 5.1 Wasteload and Load Allocations[17]

Indicator Parameter	WLAs and LAs	
	30-Day Log Mean[a]	Maximum
Fecal Coliforms	200 MPN[b]/100ml	c
E. coli	126 MPN/100 ml	400 MPN/100 ml
Enterococci	33 MPN/100 ml	100 MPN/100 ml

a. Based on a minimum of no less than 5 samples equally spaced over a 30-day period.
b. Most probable number.
c. No more than 10% of total samples during any 30-day period shall exceed 400 MPN/100 ml.

5.2 MARGIN OF SAFETY

TMDLs include a margin of safety (MOS) to account for data uncertainty, growth, critical conditions, and lack of knowledge. Data uncertainty is not much of a factor for this TMDL as the relationship between effluent limitation and water quality is relatively known. However, uncertainty exists regarding bacterial die-off and regrowth dynamics in the River. Therefore, this TMDL provides an aggressive monitoring and review plan to ensure that needed data is collected and that TMDL revisions are made if necessary. The ability to attain numeric targets

[16] The densities of individual bacteria sources are not additive. Therefore, WLAs and LAs do not add up to equal the TMDL. Rather, each WLA and LA itself must meet the TMDL (Santa Ana Regional Water Quality Control Board 1998).

[17] WLAs apply to all facilities with NPDES permits. LAs apply to all natural sources of pollution such as wildlife, discharges from Mexico at the international border, and other sources to be determined during Phase II as necessary.

is aided by the conservative analysis for load and wasteload allocations, even for relatively minor loading sources. Future growth and potential water transfers are the most likely events that could effect future pathogen densities, and these factors are discussed below.

5.3 FUTURE GROWTH

The three most likely growth events that could affect pathogen densities in the New River are: (1) population growth in Imperial Valley; (2) population growth in the Mexicali area; and (3) growth in confined animal feeding operations (CAFOs). The following sections discuss the potential impacts of these projected growth events.

5.3.1 POPULATION GROWTH IN IMPERIAL VALLEY

In the U.S. portion of the New River watershed, the annual population growth is projected at 2.5% for the next 20 years, according to the Valley of Imperial Development Alliance. This growth will increase domestic wastewater discharged into the New River, from the current 8.7 mgd to a projected 13.8 mgd. Effluent from point sources, and discharges from nonpoint sources, will be required to meet bacterial water quality objectives. Additionally, as WWTPs reach 80 percent of design capacity, dischargers will continue to be required to consistently comply with their NPDES permits.

5.3.2 POPULATION GROWTH IN THE MEXICALI AREA

In the Mexican portion of the New River watershed, the annual population growth for the Mexicali municipality is projected at 2.6% (INEGI 2001). The area has a population of 763,902, according to the most recent census (INEGI 2001), and population is expected to increase to about 1,278,000 within 20 years. This unprecedented growth will increase domestic and industrial wastewater discharged into the New River, from the current estimated 30-40 mgd to a projected 59-67 mgd.

Mexicali lacks an adequate sewage collection and treatment system for current and projected flows. A Mexicali II collection and treatment system with a rated capacity of 20 mgd is under construction to accommodate eastern Mexicali, with completion expected by late 2002. However, like the current system of lagoons, the new system will not include disinfection facilities. This will likely result in continued violation of Minute No. 264, as well as chronic and significant violation of this proposed TMDL, even if pollution control is successful in the U.S.

Wastewater quality in the Mexicali area will likely improve due to on-going and already approved and funded sewage infrastructure projects scheduled for completion within the next 2 to 5 years. Local demand for that water will increase because of Mexicali's growing population. Mexico may decide to reuse as much as 50 mgd of wastewater that it currently discharges into the New River. Such a diversion of wastewater would decrease New River flows and might further degrade water quality at the International Boundary if Mexico continues to send the rest of its untreated and partially treated wastes.

5.3.3 GROWTH IN THE CAFO SECTOR

Existing confined animal feeding operations (CAFOs) from outside Imperial County may relocate into the County, due to expanding metropolitan populations in San Diego County, Orange County, Riverside County, and the Central Valley. This would result in growth in the CAFO sector for Imperial County. CAFO facilities will continue to be controlled through General NPDES permits, which generally prohibit pollutant discharges into surface waters and require containment of on-site wastewater, including contaminated runoff[18].

5.4 POTENTIAL WATER TRANSFERS

Imperial Valley cultivation acreage is projected to remain relatively constant at approximately 480,000 acres. However, irrigation deliveries may decrease as much as 300,000 AFY because of a potential water transfer from IID to the San Diego County Water Authority. The water to be transferred is irrigation water "conserved" by IID and Imperial Valley farmers. The New River's resulting flow would be about 300,000 AFY. (This is based on using the ratio of the New River flow at its delta with the Salton Sea to the total outflow of the New River-Alamo River-IID Drains system, and assuming that the 300,000 AFY reduction in irrigation deliveries will result in an equal decrease in total drain flow as a worst case scenario.) However, dilution is not a factor in this pathogen TMDL. IID and the San Diego County Water Authority will prepare an EIS/EIR to address potential environmental impacts resulting from the proposed water transfer.

[18] Without controlling impacts from pathogenic discharges from Mexico, it will be very difficult to measure acute impacts caused by CAFOs downstream of the international border.

6. LINKAGE

The linkage analysis involves establishing the connection between pollutant load allocations and the protection of beneficial uses. The relationship between source loading and the New River's assimilative capacity also is addressed. Such information is useful in evaluating the degree and duration of required effort, including mitigation options, to achieve WQOs.

For this TMDL, there is a one-to-one relationship between load allocations and numeric targets. For example, a 30-day geometric mean wasteload/load allocation of 200 MPN/100 ml for fecal coliforms at the point of discharge guarantees 200 MPN/100 ml or less in the River. The potential for increased concentration downstream due to growth and decay dynamics should be offset by the dilution that occurs in the New River due to agricultural return flows.

The New River's assimilative capacity can be expressed as the sum of the target and margin of safety (i.e., Assimilative Capacity = Target + MOS). Fecal coliform concentrations decrease significantly as the River travels about 60 miles from the International Boundary to its terminus at the Salton Sea (Table 6.1, below). Several factors account for the decreased concentrations, including natural die-off and dilution by agricultural return flows (tailwater and tilewater) and seepage[19]. Dilution also is aided by WWTP disinfected effluent and industrial facilitiy discharges.

Further, three weirs (north of Brawley for erosion control) increase the River's dissolved oxygen concentration (Setmire 1985) and assimilative capacity for fecal bacteria. An aeration structure, located approximately 500 feet downstream of Evan Hewes Highway, also increases the River's assimilative capacity for fecal coliforms. The weirs and aeration structure rapidly mix and re-oxygenate the River.

Bacteria respond to the increased oxygen concentration with voracious feeding. Significant bacterial die-off may occur abruptly, when the food supply is depleted or dissolved oxygen concentrations suddenly change (USEPA 1986; Thomann and Mueller 1987). Pathogenic microorganisms may respond similarly or become dormant until favorable conditions return. While temporal variability is unknown, it is believed that a direct correlation exists between water temperature and river assimilative capacity (Pickett 1997; USEPA 1986; Mancini 1978). This TMDL proposes direct and indirect controls on bacterial pollution from Imperial Valley point sources and Mexico to attain bacterial WQOs and eliminate bacteria-caused impairments. These proposals include:

1) Eliminating impairments caused by Imperial Valley WWTPs, by establishing bacterial effluent limitations on NPDES permits of all WWTPs discharging into the New River watershed;

2) Eliminating impairments at the International Boundary caused by Mexico, by coordinating actions with Mexico to disinfect Mexicali sewage effluent and eliminate remaining sources of raw sewage; and

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[19] These factors do not necessarily correlate with a reduction in pathogen densities.

3) Eliminating impairments caused by CAFOs, by enforcing the existing general NPDES permits.

These three steps are expected to result in substantial attainment of the TMDL for the New River and its tributaries, which in turn will significantly reduce the public health threat from pathogens. Completion of these steps is essential before addressing pollutant contributions from more diffuse sources, or characterizing microbiology and other factors (e.g., die-off).

Table 6.1 Bacteria in the New River at the International Boundary and Upstream of the Salton Sea Delta

		Fecal Coliforms (MPN/100 ml)		***E. coli* (MPN/100 ml)**	
Location	**Month**	**Geometric Mean**	**Maximum**	**Geometric Mean**	**Maximum**
New River at International Boundary	Jan	5,894,450	16,000,000	NA	NA
	Feb	56,671	130,000	48,203	80,000
	Mar	201,882	220,000	137,525	170,000
	Apr	177,686	300,000	60,732	80,000
	May	NA	NA	NA	NA
	Jun	274,572	300,000	169,410	220,000
	Jul	421,716	500,000	205,434	300,000
New River Upstream of the Salton Sea Delta	Jan	9,000	9,000	NA	NA
	Feb	928	20,000	43	20,000
	Mar	2	2	2	2
	Apr	54	40,000	54	40,000
	May	NA	NA	NA	NA
	Jun	200	200	43	200
	Jul	246	500	134	230

7. IMPLEMENTATION PLAN

7.1 LEGAL AUTHORITY AND REQUIREMENTS

7.1.1 INTRODUCTION

The Regional Water Quality Control Board has the responsibility and authority for regional water quality control and planning, per the Porter-Cologne Water Quality Control Act (contained in Division 7 of the California Water Code. The Regional Board establishes water quality objectives by amending its Water Quality Control Plan for the Colorado River Basin (Basin Plan). The Regional Board also controls point source pollution by implementing a variety of full regulatory programs, including the NPDES Program for point sources discharging into waters of the United States. The State's controls nonpoint source pollution as specified in the State's "*Plan For California's Nonpoint Source Pollution Control Program*," including "*Volume I: Nonpoint Source Program Strategy and Implementation Plan for 1998-2013 (PROSIP)*" and "*Volume II: California Management Measures for Polluted Runoff (CAMMPR)*" (hereafter referred to as "State NPS Management Plan").

The cornerstone of the State NPS Management Plan is a "three-tiered approach," consisting of implementation of self-determined best management practices (Tier 1), regulatory-encouraged best management practices (Tier 2), and effluent requirements (Tier 3). The Regional Board is not required to sequentially move through the tiers (e.g. Tier 1 to Tier 2 to Tier 3). The Regional Board may move directly to enforcement actions specified in Tier 3, depending on water quality impacts and problem severity. The Regional Board also may implement a combination of water quality control mechanisms from each of the Tiers or other remedies (e.g., enforcement orders), as provided under the CWC.

7.1.2 REQUIRED COMPONENTS OF TMDL IMPLEMENTATION PLANS

The Regional Board must approve an implementation plan for achieving adopted water quality objectives[20] (CWC § 13242). The implementation plan must include, but is not limited to, a description of: (1) necessary actions to achieve WQOs, including recommendations for public or private entities; (2) time schedules for actions to be taken; and (3) monitoring and surveillance to be undertaken to determine compliance. The Basin Plan amendment process is certified by the Secretary for Resources as "functionally equivalent to," and therefore exempt from, the California Environmental Quality Act (CEQA) requirement for preparation of an environmental impact report, negative declaration, and initial study (California Code of Regulations (CCR) Title 14, §15251(g)). However, a CEQA-required Environmental Checklist is required.

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[20] Also, 40 CFR 130.6(c)(6) requires identification of implementation measures necessary to carry out a Water Quality Control Plan, including financing, the time needed to implement the Plan, and the economic, social and environmental impact of carrying out the Plan in accordance with CWA Section 208(b)(2)(E).

7.1.3 OVERVIEW OF PROPOSED TMDL IMPLEMENTATION PLAN

Regional Board staff proposes that the Regional Board adopt a Basin Plan amendment that establishes this TMDL and corresponding implementation plan. This proposal is consistent with the aforementioned requirements and the State's NPS Management Plan. The implementation plan specifies: (1) required actions for responsible parties, and recommended actions for other agencies/organizations; (2) time schedules for actions to be taken; and (3) monitoring and surveillance to be undertaken to determine progress toward attaining deadlines and milestones. Also, the CEQA Checklist and Determination of Significant Environmental Impacts (Attachment 3) assesses potential environmental impacts of the proposed Basin Plan amendment. Further, the proposed implementation plan identifies the means for TMDL compliance, evaluates economic impacts of TMDL implementation, and identifies potential funding sources for pollution control (Section 7.8 of this document), pursuant to CWC § 13141 and § 13241.

The proposed implementation plan will take place in two phases, after USEPA approval. Phase I consists of actions to be accomplished between 2001 and 2004, and focuses on controlling pathogenic sources associated with wastewater discharge in the U.S. and at the International Boundary. Phase I also relies on confined animal feeding operations (CAFOs) to maintain compliance with an existing board order that regulates containment structure design. There are two separate but complimentary monitoring activities: (1) monitoring activities to be conducted by responsible parties (mainly WWTPs and CAFOs); and (2) monitoring and surveillance activities to be conducted by Regional Board staff. The following sections describe these activities, and list agencies providing financial and technical assistance.

If water quality targets are not achieved upon conclusion of Phase I, Phase II will begin and the time period will be extended. Phase II requires further assessment of bacterial contributions from sources not addressed in Phase I, and requires the development of implementation actions to control these sources. The dual phase approach allows for immediate control of major sources while allowing time for monitoring to provide an analytical basis for Phase II planning.

7.2 RESPONSIBLE PARTIES

All waste dischargers are responsible for the quality of their waste and for ensuring that discharges do not adversely impact the beneficial uses of waters of the State. For the purposes of this TMDL, dischargers include owners and operators of NPDES WWTPs and NPDES CAFOs. The USEPA and U.S. Section of the IBWC also are responsible parties for ensuring that discharges from Mexico do not violate the TMDL.

7.2.1 NPDES WWTP DISCHARGERS

Eight WWTPs have NPDES permits to discharge treated domestic wastewater into the New River and its tributaries. The owners and operators of these facilities are identified jointly in the permits as "discharger." Facility names and addresses are shown in Table 7.1, below.

Table 7.1 NPDES WWTP Dischargers

Discharger Name	Facility Name	Facility Address
City of Calexico	City of Calexico WWTP	298 East Anza Road Calexico, CA 92231
State Department of Corrections	Centinela State Prison WWTP	2302 Brown Road Imperial, CA 92251
United States Navy Department	El Centro Navy Air Station WWTP	Public Works Office, Building 504 El Centro, CA 92243
City of Westmorland	City of Westmorland WWTP	295 Martin Road Westmorland, CA92281
Seeley County Water District	Seeley County Water District WWTP	1898 West Main Street Seeley, CA 92273
City of Brawley	City of Brawley WWTP	5015 Best Road Brawley, CA 92227
Date Gardens Mobile Home Park	Date Gardens Mobile Home Park WWTP	1020 West Evan Hewes Hwy. #41, El Centro, CA 92243
Imperial County	McCabe Union High School District WWTP	701 West McCabe Road El Centro, CA 92243

7.2.2 NPDES CAFO DISCHARGERS

Nine CAFOs are covered under the General NPDES Permit and General Waste Discharge Requirements for CAFOs. The owners and operators of these facilities are identified jointly in the permits as "discharger." Facility names and addresses are shown in Table 7.2, below.

Table 7.2 NPDES CAFO Dischargers

Discharger Name	Facility Name	Facility Address
Meloland Cattle Co.	Brandenberg Feed Yard	903 West Highway 98, Calexico
Pioneer Livestock Inc.	Cameiro Heifer Ranch	195 West Corey Road, Brawley
El Toro Land & Cattle Co., Inc.	El Toro Land and Cattle Co., Inc.	96 East Fawcett Road, Heber
Phillips Cattle Co., Inc.	Jackson Feedlot	495 West Heber Road, El Centro
Cattlemen's Feed & Milling	Meloland Cattle Co.	907 Brockman Road, El Centro
Phillips Cattle Co., Inc.	Phillips Cattle Co., Inc.	910 Nichols Road, El Centro
Phillips Cattle Co., Inc.	New River Cattle Feeders, Inc.	420 West Kubler Road, Calexico

Discharger Name	Facility Name	Facility Address
Max Ruegger Ruegger and Ruegger	Ruegger and Ruegger Feedlot	604 Bannister Road, Westmorland
Kuhn Farms Dairy	Kuhn Farms Dairy	1870 Jeffery Road, El Centro

7.2.3 THE UNITED STATES GOVERNMENT

The IBWC is a US-Mexican federal agency with roots in the "Treaty of Guadalupe Hidalgo of Peace, Limits and Settlement," signed by both countries in February 1848. The IBWC was established as the International Boundary Commission (IBC) in 1889 to deal with boundary issues. In 1944, the U.S. and Mexico signed the treaty entitled "Utilization of Waters of the Colorado and Tijuana Rivers and of the Rio Grande" (a.k.a. the Mexican-American Water Treaty), which was ratified by the U.S. Congress in 1945. The Mexican-American Water Treaty changed the name of the IBC to the IBWC, and expanded the IBWC's jurisdiction and responsibilities[21].

The U.S. Section of the IBWC is part of the State Department. IBWC jurisdiction extends along the International Boundary and inland into both countries where international projects were constructed. Responsibilities include the application of International Boundary and water treaties, and settling differences that may arise. The treaty specifically charges the IBWC with solving border sanitation problems and other border water quality problems.

In August 1983, the Presidents of Mexico and the United States signed the La Paz Agreement to protect and improve the environment in the border area, making the USEPA the U.S. coordinator for pursuing practical, legal, institutional and technical measures. The agreement originally made the Mexican Secretaría de Desarrollo Urbano y Ecologia (SEDUE) the coordinator for Mexico. In 1992, Mexico transferred responsibility for border problems to the Secretaría de Desarrollo Social (SEDESOL). Currently, the Comision Nacional del Agua (CNA) has primary responsibility for border water problems for Mexico.

The State Department's IBWC and the USEPA have primary responsibility for ensuring that discharges of wastes from Mexico do not cause or contribute to a violation of this TMDL. To attain this TMDL, Mexicali's sewage effluent must be disinfected and its sources of raw sewage eliminated. This will require Mexico's cooperation and U.S. assistance. Mexico's laws do not require disinfection of WWTP effluent and sewage discharges to receiving waters like the New River.

7.3 THIRD PARTY COOPERATING AGENCIES AND ORGANIZATIONS

This section describes the key cooperating agencies and organizations, and the pivotal role they play in TMDL implementation. These entities have technical expertise, resources, and

[21] Both the United States and Mexico have commissioners appointed to IBWC. Within Mexico, IBWC is called "Comision Internacional de Limites y Aguas" (CILA).

organizational structures that facilitate effective implementation of practices to address bacteria pollution.

7.3.1 NEW RIVER/MEXICALI SANITATION PROGRAM BINATIONAL TECHNICAL ADVISORY COMMITTEE

Cooperation from Mexico at all levels is essential to effectively address New River pollution from sources south of the border. The IBWC has been working with its Mexican Counterpart (CILA) and other federal and state agencies on both sides of the border, including the Regional Board, to address New River water quality problems at the International Boundary. Specifically, in October 1992, IBWC and CILA signed Minute No. 288 titled <u>Conceptual Plan for the Long Term Solution to the Border Sanitation Problem of the New River at Calexico, CA - Mexicali, Baja California.</u> Minute No. 288 established short- and long-term solutions for the sanitation of the New River at the International Boundary. The short-term measures, dubbed the "Quick Fixes," were completed in 1999 and designed for compatibility with long-term solutions and were funded through a cost-sharing agreement between both countries. The U.S. and Mexico have contributed 55% and 45%, respectively, of the total cost of $7.5 million for the Quick Fixes, which were implemented by a Binational Technical Advisory Committee (BTAC). BTAC members include:

<u>Mexico</u>	<u>U.S.</u>
• CILA (IBWC, Mexican Section)	• IBWC
• CNA (National Water Commission)	• USEPA
• CESPM (State Public Services Commission of Mexicali)	• SWRCB
• SAHOPE (Secretary of Human Settlements and Public Works)	• Regional Board
• Municipality of Mexicali	• Imperial County
	• Imperial Irrigation District

The BTAC has led to improved communication and technology transfer between the two countries. CalEPA's agencies, particularly the SWRCB and Regional Board, remain committed to continue working with the U.S. Government and local agencies in Imperial County; and with federal, state, and local Mexican officials in Baja California to address New River pollution problems.

7.3.2 THE CITIZEN CONGRESSIONAL TASK FORCE ON THE NEW RIVER (CCTF)

The CCTF, in coordination with the U.S. Bureau of Reclamation (USBR), constructed two wetlands in Imperial County that treat polluted agricultural drain waters and New River water. Imperial County and CCTF partnered to receive a 1998 Clean Water Act (CWA) 319(h) Grant to partially fund this project. The non-profit Organization Desert Wildlife Unlimited, Inc., heads the CCTF. The Imperial Irrigation District is providing matching in-kind funds and donating land for the wetlands. Additionally, Congress, through the USBR, allocated $3 million for construction of the wetlands. These pilot projects focus on remediating silt, pesticides, and selenium pollution in Ag Drain water and the New River. However, the projects also include comprehensive water quality monitoring of influent/effluent waters, as well as invertebrate, biota, plant, bacteria, and wildlife studies of the wetlands. The water quality data will serve to evaluate the effectiveness of the wetlands in addressing overall New River and Ag Drain water pollution, and to track overall New River pollution. The data also will guide design modifications.

7.3.3 NORTH AMERICA DEVELOPMENT BANK (NADBank)

The North American Free Trade Agreement (NAFTA) created the NADBank, a bilaterally funded, international organization, in which Mexico and the United States participate as equal partners. The NADBank is headquartered in San Antonio, Texas, and serves as a lead financier for public entities that seek financing for environmental infrastructure projects in the border region. The NADBank can assist border communities to identify available funding sources (e.g., grants) and to design appropriate financial plans for wastewater infrastructure projects (NADBank 2001). Services provided by the NADBank include:

- Participation in bond issues,
- Interim financing,
- Grant resources and government budget allocations through the Border Environment Infrastructure Fund (BEIF),
- Loan guaranties, and
- Technical assistance via its sister agency the Border Environment Cooperation Commission.

7.3.4 BORDER ENVIRONMENT COOPERATION COMMISSION (BECC)

The BECC was created by NAFTA and is a binational organization with headquarters in El Paso, Texas, and Ciudad Juarez, Mexico. The BECC established a Technical Assistance Program to assist eligible border communities with preliminary engineering and design studies to: (a) develop projects that address environmental problems, (b) achieve BECC certification for projects, (c) provide grants to communities for technical assistance, and (d) assist communities in obtaining BECC certification—a prerequisite for funding eligibility from NADBank and/or other sources. Funding for projects under the Technical Assistance Program comes from the USEPA (BECC 2001).

7.3.5 CALIFORNIA ENVIRONMENT COOPERATION COMMISSION (CALBECC)

In 1994, the Governors of California, Baja California, and Baja California Sur created the California Border Environment Cooperation Commission (CalBECC) to identify and promote environmental infrastructure projects along the Border, establish Border priorities, and solicit project funding. CalBECC can assist WWTP owners in soliciting funds to install disinfection facilities to comply with this TMDL.

7.3.6 UNIVERSITY OF CALIFORNIA COOPERATIVE EXTENSION, HOLTVILLE FIELD STATION

The University of California Cooperative Extension (UCCE) was developed to apply the resources of the university to local communities. It offers workshops, programs, and technical assistance to growers on a broad range of agricultural topics, including conservation management practices. UCCE farm advisors conduct research on existing local problems, and extend that information, along with other related research, to local stakeholders. The UCCE's Holtville Field Station conducts demonstration projects and research for preventing/mitigating potential water quality impacts that may result from the application of manure to farmland and to assist CAFOs. UCCE provides training courses and workshops, and could serve as a technical assistance agency for interested stakeholders.

7.3.7 UNITED STATES DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE (NRCS)

The Natural Resources Conservation Service (NRCS) is a Federal Assistance Agency. Its staff provides technical assistance and aid in securing financial assistance to support the implementation of management practices. The NRCS is assists NPDES CAFOs in developing plans and specifications for containment prescribed by the general NPDES permit for CAFOs. The NRCS also assists in dealing with unregulated CAFOs.

7.4 ACTIONS TO BE IMPLEMENTED BY DISCHARGERS IN THE U.S.

This section describes the Regional Board's regulatory approach to achieve the TMDL. It also describes the nature of actions that are required to be taken by designated responsible parties. Further, it describes the actions that cooperating third parties have agreed to undertake to facilitate the attainment of TMDL allocations through a self-determined process. And finally, it describes actions that responsible parties need to implement under self-determined, regulatory-encouraged, or full regulatory compliance with the TMDL.

7.4.1 WASTEWATER TREATMENT PLANTS (WWTPs)

All WWTPs and point source facilities are expected to provide adequate disinfection to meet WLAs specified in Table 5.1 (p. 35) and to discharge pursuant to their NPDES permits, if they discharge, potentially discharge, or propose to discharge wastes with bacteria into the New River and/or its surface water tributaries. They also are expected to monitor and report the quality of their discharge as required by their permits.

NPDES WWTPs With Disinfection Capabilities— The Regional Board will continue to enforce NPDES permits, including specified bacterial effluent limits, for the City of Calexico and the State of California Department of Corrections Centinela Prison. The Regional Board Executive Officer issued Time Schedule Order (TSO) No. 98-075 against the Navy Air Station, El Centro, because of NPDES permit violation, in particular because of bacterial effluent limits. The Navy reported on March 28, 2000, that it obtained emergency funding to upgrade its WWTP to achieve compliance with the permit. It also reported in June 2000 that its disinfection system, and in general its WWTP, are fully operational. In July 2000, the Executive Officer also issued two Administrative Civil Liability Complaints (ACLC) against the Centinela Prison. The Department of Corrections paid the ACLCs. These facilities are also expected to continue to monitor and report the quality of their effluent, including bacterial quality, as prescribed by their permits.

NPDES WWTPs Without Disinfection Capabilities— Five NPDES-permitted facilities discharge undisinfected municipal wastewater into the New River. These facilities include Seeley County Water District (SCWD), Date Gardens Mobile Home Park (DGMHP), City of Brawley, City of Westmorland, and McCabe Union School District (MCUSD). Both the City of Westmorland and City of Brawley were issued Time Schedule Orders requiring them to upgrade their WWTPs by January 2002 and March 2002, respectively. Both entities are currently securing financing from the NADBank to expand their plants. The City of Westmorland has secured financing from the United States Department of Agriculture to upgrade its WWTP. Neither the TSO nor the NPDES permits for Westmorland require disinfection. In June 2000, the Regional Board adopted an updated NPDES permit for Brawley, which prescribed effluent disinfection limits effective in 2002.

The Implementation Plan (effective after EPA approval) requires that the remaining four facilities provide adequate disinfection to meet bacterial WQOs no later than three years after USEPA approval of the TMDL. Therefore, this Implementation Plan requires that each existing NPDES permit for these four facilities be revised to: (a) incorporate the WLAs prescribed in Table 5.1, and (b) include monitoring and reporting requirements for the WLAs, in accordance with the time schedule shown by Table 7.3, below. Further, the Implementation Plan requires that time schedule orders (TSOs) be issued for Westmorland, SCWD, DGMHP, and MCUSD requiring them to submit plans, specifications, and steps to be taken to secure funds to comply with their WLAs. Table 7.3, below, outlines implementation tasks and schedules for WWTPs.

Table 7.3 Implementation Tasks and Schedules for WWTPs Discharging Undisinfected Effluent

Facility Name	NPDES Permit No.	Expiration Date	Revision Date	TSO Issuance Date	Compliance with WQOs
City of Westmorland WWTP	CA0105007	1/28/03	9/15/01	9/15/01	Year 1*
Seeley County Water District WWTP	CA0105023	6/25/02	9/15/01	9/15/01	Year 1*
Date Gardens Mobile Home Park WWTP	CAO104841	9/24/02	9/15/01	9/15/01	Year 1*
McCabe Union School District WWTP	CA0104281	11/29/00	9/15/01	9/15/01	Year 1*

*Year 1 refers to the effective date to start TMDL implementation, which shall be 30 days after USEPA approval of the TMDL.

7.4.2 CONFINED ANIMAL FEEDING OPERATIONS (CAFOS)

Order No. 01-800 (Appendix D) prescribes on-site containment of all wastewater generated from a CAFO facility, including projected precipitation on and drainage through manured areas resulting from a 24-hour storm with a 25-year return frequency. The Order also specifies minimum construction standards for containment structures (e.g., ponds), including minimum soil permeabilities and composition, and minimum separation between pond bottoms and uppermost encountered groundwater. Moreover, regarding stormwater flows in excess of the 25-year, 24-hour storm event, the Order provides that such flows may be discharged to surface waters only in compliance with USEPA's "Effluent Guidelines and Standards for Feedlot's, 40CFR Part 412". Further, the Order requires these dischargers to submit an Engineered Waste Management Plan (EWMP) with design calculations addressing compliance with the Order. CAFOs are expected to remain in full compliance with Board Order No. 01-800 (General National Pollutant Discharge Elimination System (NPDES) Permit and General Waste Discharge Requirements for Confined Animal Feeding Operations).

Several CAFOs have not submitted the Engineered Waste Management Plan required by Order No. 01-800. To prevent and eliminate water quality impacts from CAFOs, Order No. 01-800 requires CAFO owners/operators to submit an EWMP by 2001. It also requires new CAFOs to submit and implement the EWMP within 90 days from the date they begin operations and within 90 days following EWMP approval, respectively. Compliance with the Order will be enforced by one of the Regional Board's Regulatory Units.

7.5 ACTIONS TO BE IMPLEMENTED BY THE U.S. GOVERNMENT

The IBWC identified a series of sewage infrastructure projects for the Mexicali I and Mexicali II service areas to address New River pollution. The Mexicali I projects include: (a) replacement/rehabilitation of about 44,000 feet of sewage pipes, (b) rehabilitation of sewage pump stations, and (c) expansion of the Mexicali I WWTP to 30 mgd. The Mexicali II projects include: (a) construction of a new 20-mgd WWTP (a.k.a. Mexicali II WWTP), (b) sewage Pumping Plant No. 4 for the new WWTP, (c) installation of telemetry equipment for the WWTP and pumping plants, (d) construction of 31,170 feet of discharge forcemain[22] for Pumping Plant No. 4, (e) construction/rehabilitation of about 96,000 feet of sewer lines, and (f) rehabilitation of two sewage lift stations.

NADBank developed a financing plan for the projects in November 1999, and submitted the plan to USEPA and the Mexican Government for approval. USEPA approved the plan early this year, and Mexico signed the plan in June 2000. Federal, State, and local funds will pay for project costs, which total an estimated $50 million dollars. These projects are underway, and are expected to improve the New River's overall quality.

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[22] CNA is responsible for this project. As of December 1997, a CNA contractor had already installed approximately 1.5 miles of the force main, a 54-inch steel pipe. However, as of January 1998, the project has been on hold reportedly due to problems between CNA and its contractor.

However, neither the existing nor new wastewater treatment facilities include disinfection capabilities. Also, the certified projects do not address the problems of: (a) significant numbers of unregulated point and nonpoint bacteria sources discharge directly into the New River watershed in Mexicali, and (b) an unknown number of raw sewage bypasses. Therefore, the projects by themselves will not result in TMDL attainment downstream of the International Boundary. Consequently, the State Department's IBWC and the USEPA need to take additional steps to ensure that waste discharges from Mexico do not cause or contribute to TMDL violation. Therefore, the U.S. Section of the IBWC and the USEPA are requested to take the actions listed in Table 7.4, below, pursuant to Section 13225 of the California Water Code:

Table 7.4 Implementation Tasks and Schedules for the U.S. Government

Task	Date for Implementation
1. Submit a technical report to the Regional Board with proposed measures (e.g., plans and specifications for disinfection facilities) to ensure that waste discharges from Mexico do not cause or contribute to TMDL violation.0 The report must specify the parties responsible for implementation of the measures and include a time schedule for implementation	6 months from USEPA approval of the TMDL
2. Submit a report identifying financial options for implementation of the measures discussed in Task 1, above.	1 year from USEPA approval of the TMDL
3. Complete implementation of the measures.	3 years from USEPA approval of the TMDL
4. Submit semi-annual progress reports to the Regional Board regarding progress towards completion of the measures.	By the 15th day of every 6th month, with the first report due 6 months from USEPA approval of the TMDL, after submission of the technical report required in Task 1, above.

7.6 WATER QUALITY IMPROVEMENT GOALS

For Phase I of this TMDL, the main goals are that:

- All NPDES WWTPs provide effluent disinfection within three years following USEPA approval of this TMDL so that the impairments they are causing are resolved; and

- The U.S. Government substantially reduce the New River's public health threat at the International Boundary by ensuring that municipal waste discharges into the New River watershed in Mexicali are adequately disinfected and that all raw sewage discharges to the New River are eliminated.

The Regional Board believes that these two measures alone will result in TMDL attainment. For Phase II of this TMDL, staff will begin to develop measures as necessary to deal with residual bacterial pollution from nonpoint sources in the U.S. and at the International Boundary. These measures will be based on pathogen contribution from nonpoint sources and monitoring results.

7.7 MONITORING FOR REFINEMENT OF SOURCE ANALYSIS AND TMDL IMPLEMENTATION

This section describes Regional Board monitoring and surveillance actions to refine the Source Analysis and measure TMDL compliance. It is important to track TMDL implementation, monitor water quality progress, and modify TMDLs and implementation plans as necessary to:

- Address uncertainty that may exist in aspects of TMDL development;
- Oversee TMDL implementation to ensure that implementation is being carried out; and
- Ensure that the TMDL remains effective, given changes that may occur in the watershed after TMDL development.

The Regional Board will implement two types of monitoring: (1) water quality monitoring, and (2) surveillance and implementation tracking. Both are discussed further in the sections below.

7.7.1 WATER QUALITY MONITORING

The New River Bacteria TMDL Monitoring and Tracking Program will monitor pathogen-indicator organisms, pursuant to the Regional Board Quality Assurance Project Plan (QAPP). Regional Board staff will develop the New River QAPP by November 30, 2001. This QAPP will include, at a minimum, a sampling station for: (a) the New River at the International Boundary, (b) the New River at its outlet to the Salton Sea, (c) a representative number of major and minor Ag Drains in the New River watershed, and (d) selected areas where other point sources threaten water quality. Monitoring will characterize pathogen-indicator organisms and track compliance with numeric targets. Monitoring Program objectives include:

- assessment of water quality standards attainment;
- verification of pollution source allocations;
- calibration or modification of selected models (if any);
- evaluation of point and nonpoint source control implementation and effectiveness;
- evaluation of in-stream water quality; and
- evaluation of temporal and spatial trends in water quality.

Monthly grab samples from sampling stations will be collected and analyzed for the following parameters:

- Flow (to be obtained from IID or USGS)
- Dissolved Oxygen
- pH
- Temperature
- Fecal coliform organisms
- *E. coli*
- Fecal streptococci
- Enterococci

Additionally, WWTP discharges will continue to be monitored for fecal coliform and/or *E. coli* bacteria as part of their NPDES permits. Enterococci monitoring will be required when tests become commercially available in the Region.

7.7.2 SURVIELLANCE AND IMPLEMENTATION TRACKING

By November 30, 2001, Regional Board staff will develop a plan to conduct surveillance and implementation tracking track activities and surveillance performed as part of this TMDL. The objectives are to:

- Assess, track, and account for practices already in place;
- Measure milestone attainment;
- Determine compliance with NPDES permits, WLAs, and LAs; and
- Report progress toward implementation of NPS water quality control, in accordance with the SWRCB NPS Program Plan (PROSIP).

7.8 TMDL REVIEW SCHEDULE

Regional Board staff shall present quarterly reports to the Regional Board describing progress toward milestone attainment. The reports will assess:

- Water quality improvement (in terms of total fecal coliform organisms and E. coli);
- Control measures implemented to deal with pollution originating in Mexico;
- Whether milestones were met on time or at all. If milestones were not met, the reports will discuss the reasons; and
- Level of compliance with measures and timelines of TSOs and Regional Board requests.

7.8.1 TRIENNIAL REVIEW

The State must hold public hearings for reviewing applicable water quality standards (WQS), and modifying/adopting the standards as appropriate, pursuant to Section 303 of the Clean Water Act and to 40 CFR 130. The State also must formulate and periodically review (and update as necessary) Regional water quality control plans, pursuant to Section 13240 of the California Water Code. Following adoption by the Regional Board, Basin Plan amendments and supporting documents are submitted to the SWRCB and then the State Office of Administrative Law for review and approval. USEPA also has approval authority over Basin Plan amendments.

The first TMDL review is scheduled to conclude three years after TMDL adoption to provide adequate time for implementation and data collection. Subsequent reviews will be conducted concurrently with the Triennial Review of the Basin Plan. The TMDL review schedule is shown below in Table 7.5.

Table 7.5 TMDL Review Schedule

Activity	Date
Adoption	Jun 2001
Begin Review	Jul 2003
End Review (Regional Board Public Hearing)	Feb 2004
Submit Administrative Record to SWRCB	Jun 2004
Begin Review	Jul 2006
End Review (Regional Board Public Hearing)	Dec 2006
Submit Administrative Record to SWRCB	Mar 2007
Etc.	

Public hearings will be held at least every three years to review this TMDL. At these hearings, the Regional Board will:

- review monitoring results,
- review progress toward milestone attainment,
- consider approval of proposed management practices for the control of pathogens from human-made nonpoint sources of pollution,
- consider enforcement action, and
- consider revision of TMDL components.

This proposed review schedule indicates the Regional Board's commitment to periodic review and refinement of this TMDL, via the Basin Plan amendment process.

8. PROPOSED AMENDMENT

Attachment 1 includes a draft Regional Board Resolution to adopt the draft Basin Amendment (Attachment 2) establishing this TMDL and TMDL Implementation Plan.

The draft Basin Plan Amendment:

- Deletes dated information that is no longer accurate.
- Establishes site-specific water quality objectives for the New River of 200 MPN/100 ml for Fecal Coliforms, 126 MPN/100 ml for *E. coli*, and 33 MPN/100 ml for Enterococci (all 30-day Geometric Means) for the entire U.S. length of the River.
- Adds a Section for this TMDL that:
  - Summarizes the "technical" TMDL elements, including the Problem Statement, Numeric Target, Source Analysis, Margin of Safety, Seasonal Variation/Critical Condition information, Loading Capacity, and Allocations
  - Establishes numeric targets
  - Designates responsible parties and management actions
  - Describes the recommended actions for cooperating agencies
  - Describes TMDL compliance assurance and enforcement activities
  - Describes Regional Board monitoring, tracking, and assessment activities to monitor TMDL implementation
  - Describes the public reporting activities for this TMDL
  - Describes the Regional Board review process for this TMDL

9. ENVIRONMENTAL CHECKLIST

9.1 CEQA SUMMARY

The Secretary of Resources certified the basin planning process as exempt from certain requirements under the California Environmental Quality Act (CEQA), including preparation of an initial study, a negative declaration, and an environmental impact report [Title 14, California Code of Regulations, Section 15251(g)]. This TMDL and its supporting attachments are a proposed amendment to the Basin Plan, and, therefore, are part of the basin planning process. Thus, the proposed amendment is considered functionally equivalent to an initial study, a negative declaration, and an environmental impact report. Included in the functionally equivalent amendment are the: New River Pathogen Total Maximum Daily Load; Draft Resolution; Basin Plan Amendment; CEQA Checklist; and Economic Analysis of the New River Pathogen TMDL.

The CEQA Checklist (Attachment 3) notes that the impacts associated with the Basin Plan amendment are less than significant with mitigation. The discussion accompanying the CEQA Checklist (Attachment 3) summarizes the types of impacts that may occur as a result of the implementation of sediment control measures. As the implementation program develops, the Regional Board will consider any impacts associated with resulting Basin Plan amendments.

9.2 ALTERNATIVES TO PROPOSED PROJECT

The following three sections discuss the preferred alternative (i.e., this proposed TMDL), a "No Action Alternative," and other alternatives.

9.2.1 THE PREFERRED ALTERNATIVE

The proposed New River Pathogen TMDL (i.e., the preferred alternative) is a reasonable and feasible approach to decrease existing enteric bacteria densities to a level associated with acceptable health risks for water contact recreation. Bacteria numeric targets are based on federal bacterial water quality criteria that are expected to: (a) attain and maintain designated beneficial uses, (b) eliminate existing water quality impairments, and (c) eliminate public health threats. The proposed time schedule outlined in the TMDL implementation plan requires compliance within three years. This time schedule is moderately aggressive, yet reasonable, and was established taking into account pollution severity and the ability of responsible parties to implement tasks. The time schedule provides responsible parties with the necessary time to explore financial options and undertake supplemental CEQA studies, as necessary

9.2.2 NO ACTION ALTERNATIVE

The "No Action" alternative means that the Regional Board would not adopt this TMDL, the TMDL implementation plan, or a monitoring program. This alternative does not comply with the CWA or meet the purpose of the proposed action, which is to eliminate ongoing violations of Basin Plan water quality standards, water quality impairments, and public health threats.

9.2.3 OTHER ALTERNATIVES

Alternatives to the proposed Basin Plan amendments and TMDL fall into two categories: (1) alternate deadlines for TMDL compliance, and (2) alternate numeric targets. A combination of the two is also possible. The two categories are discussed below.

Implementation of alternate deadlines for compliance could consist of deadlines that are less stringent or more stringent than the proposed (i.e., preferred) ones. A more stringent schedule (e.g., requiring compliance immediately after TMDL adoption or within one year) is not realistic as the schedule would not afford the owners and operators of affected WWTPs and the U.S. Government the opportunity to plan and evaluate effective ways to ensure TMDL compliance. A more relaxed schedule (e.g., 5 years) is not acceptable because it fails to resolve water quality impacts at the earliest practicable date, which is at the heart of the TMDL process.

Implementation of alternate numeric targets could consist of targets that are less stringent or more stringent than the proposed (i.e., preferred) ones. These options were considered and judged to be unacceptable for this phased TMDL. Less stringent numeric targets would increase the public health threat. Further study would prolong the impaired state of the New River and possibly the Salton Sea. More stringent numeric targets would place an unnecessary economic hardship to responsible agencies/parties because of additional wastewater treatment.

10. ECONOMIC CONSIDERATIONS

10.1 ESTIMATED TMDL IMPLEMENTION COSTS AND POTENTIAL FUNDING SOURCES

The Regional Board must consider economics in promulgation of WQS, per Section 13241(d) of the California Water Code. The Regional Board also must estimate the cost of any agricultural water quality control program prior to implementation, and must identify funding sources, per Section 13141 of the Porter-Cologne Water Quality Control Act. This TMDL does not establish any new requirements or standards for agriculture.

10.1.1 COST TO WWTPs

Regional Board staff prepared TMDL compliance annual cost estimates to NPDES WWTPs discharging treated but undisinfected wastewater into the New River and/or its tributaries. The State Water Resources Control Board (State Board), Division of Clean Water Programs, reviewed these costs, at the request of the State Board's Economics Unit (Attachment 4). Costs are presented in Table 10.1, below.

Table 10.1 Potential Costs for NPDES WWTPs

Waste Water Treatment Facilities - Daily Amounts and Annual Costs[23]					
	McCabe School	**Date Gardens**	**Seeley**	**West-morland**	**Brawley**
Avg. Daily Flow (gal/day)	1,500	11,000	15,000	225,000	4.2 million
Peak Daily Flow (gal/day)	4,500	22,000	30,000	500,000	8.4 million
Total Capital Cost	$100,000	$100,000	$250,000	$500,000	$1,000,000
Amortized Capital Cost	$8,700	$8,700	$21,800	$43,600	$87,000
Annual Operation & Maintenance Cost	$12,000	$15,000	$20,000	$24,000	$90,000
Total Annual Cost	$20,700	$23,700	$41,800	$67,600	$177,000
Monitoring Costs[1, 2] (fecal coliform and *E. coli*)	$2,400	$2,400	$2,400-$3,000	$2,400-$3,000	$2,400-$3,000

Notes: [1] Estimates provided by Trojan, Inc.
[2] Minimum cost based on collection of five samples per month for fecal coliform and *E. coli* analyses.

[23] Westmorland and Brawley costs are included for comparison purposes. Both of these cities prepared and certified CEQA documents to upgrade/expand their WWTPs to provide disinfection.

10.1.2 POTENTIAL FUNDING SOURCES

Potential funding sources for these facilities include the NADBank, a bilaterally-funded international organization in which Mexico and the United States participate as equal partners. NADBank serves as a lead financier for public entities that seek financing for environmental infrastructure projects in the border region. NADBank can assist border communities to identify available sources of funds (e.g., grants) and to design appropriate financial plans for wastewater infrastructure projects (NADBank 2001). Services include:

- Participation in bond issues,
- Interim financing,
- Grant resources and government budget allocations through the Border Environment Infrastructure Fund (BEIF),
- Loan guaranties, and
- Technical assistance via NADBank's sister agency, the Border Environment Cooperation Commission.

Other potential funding sources include:

1. Private financing by individual sources.
2. Bond indebtedness or loans from government institutions.
3. Surcharge on sewer users.
4. State and/or Federal low-interest loans.
5. State Proposition 13 (Costa-Machado Act of 2000) grant funds.
6. Single purpose appropriations from Federal and/or State legislative bodies.

10.1.3 U.S. GOVERNMENT COST AND POTENTIAL FUNDING SOURCES

Cost estimates were prepared for constructing a recommended WWTP at the International Boundary for "in-stream" treatment of the entire New River flow (approximately 230 cfs) (J.M. Montgomery 1987). The recommended WWTP consists of headworks, extended aeration, and chlorination facilities. Costs are as follows:

	In 1987 dollars	**In 2000 dollars***
Capital	$41,000,000	$55,965,000
Operation & Maintenance	$2,500,000 - $3,000,000	$3,412,500 - $4,095,000

* Estimated, since final inflation rates are not published yet for fiscal year 2000.

Regional Board staff also evaluated two treatment alternatives for disinfecting municipal wastewater flow from current and proposed lagoon systems in Mexicali. The first treatment alternative is a hypo-chlorite type of chlorine application, and the second treatment alternative is a gaseous chlorine type facility. Table 10.2, below, provides the estimated costs.

Table 10.2 Potential Costs for Disinfection of Mexico's Wastewater

	Alternative A Hypo-chlorite	Alternative B Gaseous Chlorine
Capital Costs	$625,000	$1,250,000
Operation & Maintenance Costs (per year)	$730,000	$243,000

Capital costs are average figures that the consulting firm of CH2M Hill recently used for the construction of similar facilities in the United States. These capital costs do not include land acquisition costs, but the amount of required land would be minimal as disinfection facilities can be built on the existing footprints of exiting and proposed lagoons.

The cost of chlorine, which is dependent upon the dosage amount, is a primary factor that affects treatment cost for these alternatives. The values in the table above are based on a chlorine dosage of 20 mg/l (at $0.55 - $0.60/lb). A study of a WWTP's effluent is needed to determine the proper dosage, as many factors (e.g., amount of algae present) may affect the dosage.

Disinfection of the entire New River flow in the U.S. is not recommended because of safety issues and the magnitude of such an effort. Disinfection of Mexicali's WWTP effluent is more practical and effective.

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